Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: Plymouth Bldg. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....$5.00 a year
Canada.....$6.00 a year
Foreign Edition, London.....£1 12s. ($8.00) a year
Single Copies.....15 cents each

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLVII., No. 25. FRIDAY, DECEMBER 17, 1909.

CONTENTS

EDITORIAL:
Editorial Notes 1177
Moral Effect of Railway Regulation 1178
Decision in the Chicago Live Stock Switching Case 1179
Fuel Economies 1179
New Books 1180

LETTERS TO THE EDITOR 1181

ILLUSTRATED:
Converted Mallet Locomotive for the Great Northern 1185
New York Tunnel Extension of the Pennsylvania 1189
Railway Motor Car for Siam 1194
McKeen Motor Car for Norfolk & Southern 1194
Use of Waste Gases in Southern Pacific Rolling Mill 1195
Fifty-ton Box Car with Steel Underframe 1197
Rail Creeping on Wet Sub-Grade 1199

MISCELLANEOUS:
Passenger Conductors and Their Employers 1184
Turntables 1186
The Bonus System on the Santa Fe 1192
Football Traffic on the New Haven 1195
Subways in New York and in Paris 1197
The Protective Tariff and Railway Regulation 1201
Progressive Safety 1203
Foreign Railway Notes 1184, 1193, 1203

GENERAL NEWS SECTION 1204
SUPPLY TRADE SECTION 1217

A fleeting and transitory sidelight on the ratio and relations of the automobile to the railway as a competitor is thrown by the returns printed elsewhere of the New Haven's football passenger traffic on the day of the last Yale-Princeton game. During the two years intervening between the Yale-Princeton game of 1907 and the game of 1909 at New Haven the number of automobiles at the game—and in the country—enormously increased and the weather, pleasant on both occasions, was a constant factor. At the last game the New Haven steam business from and to New York showed an increase from 13,418 round trip passengers to 17,844 passengers, or nearly 25 per cent. From five Connecticut cities, including Hartford and Bridgeport, it fell from 4,842 to 3,406 passengers, or about 42 per cent. The trolley business from those cities in both years was a negligible factor. The distance between New York and New Haven is about 73 miles, the average distance between the five Connecticut cities and New Haven about 29 miles. If allowance be made for 2,700 more football tickets bought by Princeton than in 1907 the percentage of gain in New York passengers reduces to 11 per cent. But, on the other hand, a larger number of tickets than usual were sold this year in the five Connecticut cities, yet with a loss of 42 per cent., as stated, of railway passengers to be charged up, apparently, to the automobiles. There may be, of course, hidden elements in the returns. There may have been some variations in the conveniences of train service, and the transit by automobile to a "big" football game does not quite square with the daily and normal uses of the machine. But, with all allowances for error there remains in the striking figures a residuum of suggestion that in its relations of rivalry to the steam road the automobile is a short distance rather than a long distance competitor; and, in the reversed relation, may it not also be a very important, if not offsetting, short distance "lateral" feeder? In neither case, for obvious reasons, can its effect on railway business be accurately measured any more than the effect of the long distance telephone. But, in the absence of sunlight any minor gleams or even mild phosphorescence on the subject are interesting, if not deeply significant.

Charles Deyo, a freight brakeman of the Great Northern, is one of those railway men, coming to notice now and then in all parts of the country, who have the grit to do their duty in spite of all hindrances. We read that he was the hind end man on a freight train which one night took the side track at Dryden, Wash., to clear the main track for an express train. In dropping off from the caboose he struck a ground switch, and fell, breaking his hip and badly injuring one arm. In spite of the injury and suffering, however, he dragged himself over 300 feet of frozen ground in time to straighten the switch at the entrance of the siding before the express train appeared. Having accomplished this, he fell, fainting, and was found unconscious by the other trainmen. We are glad to see that the newspapers praise Deyo, and that his deed is to be brought to the attention of the Carnegie Hero Fund Commission. Heroism is manifested on engines and cars all over our railways in the routine performance of duty every day. At best this must go unrecorded for the most part, and it is well that exceptional cases like that here reported should receive full notice. We should be still more pleased if the newspapers would give adequate praise to the bravery of the railway officer who has the courage to provide his switches with distant signals, and who thereby relieves trainmen of the liability to such painful crises. It should not be necessary, in a case like that here reported, that to the bodily distress due to an injury, the brakeman should have to add mental distress lest a passenger train shall be wrecked. With suitable signals, not very costly, the passenger train would be duly warned of the misplaced switch without action on the part of the brakeman. Better still, and with even less expense for apparatus or fixtures, the regulations could provide that the passenger train should not leave the last preceding station until advised by telegraph that the freight had cleared the main track and the switch had been set right for the passenger train. But, as we have suggested, improvements of this kind have to be made by heroic men in the offices, not by those on the cabooses.

The *St. Louis Globe-Democrat* is one of the favorite newspapers of railway men all over the country because of its excellent railway news department. Its comments on railway affairs are usually intelligent and fair. But an editorial it recently printed illustrates how the best-edited publications of general circulation are apt at times to discuss rate matters from a wrong standpoint. It remarked that the sleeping car rate from St. Louis to New York is still the same as it has been for some years, although the running time of trains between the two cities has been much reduced. "Railway expenses have been reduced," it said, "to a one-day basis, but the sleeping car charge is still for three days. Is it not the duty of the Interstate Commerce Commission to look into sleeping car methods and of Congress to investigate and act?" It might easily be shown that while the running time of trains has been reduced there have been heavy increases in the cost of building sleeping cars, due to great advances in the wages of labor and the prices of materials, and to improvements in the cars; and also that there have been large in-

creases in the cost of operating sleeping cars owing to similar causes. On the basis of cost of service, therefore, there is good reason why sleeping car rates should be maintained. But even if the *Globe-Democrat* were right in assuming that the cost of the service has been reduced, that would not be an argument for reducing rates. Which would the editor of the *Globe-Democrat* rather ride in, a car that is hauled from St. Louis to New York in three days, or a car that is hauled there in 24 hours? Obviously, in the latter. Why? Because he will lose less time, which makes fast service an improvement over and more valuable than slow service. But if the *value* of the service to the busy man has increased, with what fairness can it be contended that it should be rendered to him for less money? It may be replied that it is not the sleeping car company but the railway which furnishes the more valuable expedited service. But since the Pullman Company is merely the agent of the railway in furnishing sleeping car service, it would seem that they should be allowed to determine how they will divide the benefit of any reduction in transportation expenses resulting from improvements in service without the intervention of Congress or the Interstate Commerce Commission. The logical application of the *Globe-Democrat's* theory would mean that sleeping car rates between St. Louis and New York, as well as elsewhere, would be the lowest on the fastest trains and highest on the slowest. Everybody would then try to get on the fastest trains. How does the *Globe-Democrat* think that would be liked by those who could not get on the fast trains, and were required to pay a higher sleeping car fare for riding on the slower trains?

THE MORAL EFFECT OF RAILWAY REGULATION.

The University of Texas has published a monograph on "Railroad Transportation in Texas," by a member of its faculty, Professor Charles S. Potts, which contains probably the fairest, most instructive and most judicial discussion of railway policy in the Lone Star state that has been published. While in strong sympathy with the general policy that has been followed, Professor Potts frankly criticizes the railway commission's valuation of railways, its administration of the stock and bond law and the limits it has put on railway rates and earnings. The stock and bond law prohibits a railway from issuing, except in cases of emergency, securities in excess of the valuation placed on its property by the commission, and the commission places the valuation of all railways in the state at a little over $200,000,000, although they are taxed on an assessment of over $400,000,000. Professor Potts believes that a fair re-valuation would show they are worth what they are taxed on. The low valuation imposes a limitation of their security issues, the effect of which, he thinks, has been to prevent needed improvements and extensions. He also "doubts the political wisdom of such a strict policy" of limiting rates as has been followed. He says:

> "The logic of the situation is against it. The truth is that Texas stands greatly in need of more roads and better roads. . . . Now, where is the money to come from? Mainly from the companies and interests that own and control the present mileage. But these companies are greatly over-capitalized, if we accept the values fixed by the commission. . . . It would seem, then, that the only way to secure the necessary betterments would be to allow sufficient earnings to meet all fixed charges and have a surplus to be used for extensions and permanent improvements."

But while Professor Potts thinks some economic mistakes have been made that have hurt the state, he defends the general policy pursued. He says:

> "Political and social institutions are not founded primarily for money-making or the exploitation of natural advantages. Any community can well afford to delay somewhat the building of railways and the felling of forests, if such delay be the price that must be paid for the preservation of its republican institutions. . . . Since the railways have now been reduced from the position of masters to that of servants of the people, the state can afford to adopt a policy sufficiently liberal to allow the companies to make the many extensions and betterments which all agree are necessary to provide the community with adequate railway facilities."

The views expressed by Professor Potts suggest that a disproportionately large amount of discussion has been devoted to the material aspects of railway regulation in Texas and elsewhere, to the neglect of its moral phases. It is a great mistake to assume that the popular feeling and agitation against railways have been inspired solely by the desire to travel and ship goods more cheaply. They have arisen largely out of indignation against moral and political abuses for which railways have been considered mainly responsible. The use of the free press and the professional lobbyist to influence political conventions and legislatures; the secret and unlawful giving of rebates to favored shippers, and unfair discriminations between localities; the occasional employment of unscrupulous and dishonest methods of financiering—these and other similar things have caused many people to join in the propaganda against railways as a means of effecting needed moral reforms who would not have joined in it for purely material reasons. They often have mistakenly assumed that the railways were entirely to blame for the abuses which they attacked. They often have overlooked the fact that no pass was ever issued, no bribe ever paid, no rebate ever given, without being received by someone, if not actually solicited. But, while the stigma and the punishment have often not been visited on those most deserving them, railway men would be the last to say that, from the moral standpoint, railway regulation has not been a wholesome thing. Its economic results have perhaps oftener been bad than good. The opposite is decidedly true of its moral results up to the present time. The almost total extirpation of rebating, the suppression of the indiscriminate giving of interstate free passes, the successful revolts in many states against railway domination of politics and legislatures, the widespread publicity and scrutiny of railway financiering, have put the railway business and the relations between the roads and their patrons and public authorities, on a higher plane than ever before. Things are still done that ought not to be done. Places there still are where railways dominate politics and government in ways and to degrees that are shameful. But these are exceptions. Railway officers there still are who have not been able to adapt themselves to the new regime, and who would welcome a return to the old conditions in which they developed to perfection kinds of talents for getting business and controlling legislation that are not now in much demand. But a large majority of railway men are glad that a change has taken place which puts a premium on ability for getting business by fair and lawful means instead of by rebates, and for influencing public opinion, commissions and legislatures by good and honest management of railways and by effective presentation of facts and sound argument, instead of by insidious and corrupting methods.

Will the new and cleaner means be as effectual as the old were in protecting railways from unfair attacks? That will depend largely on how generally they are adopted and how thoroughly and consistently they are tried. It is an axiom of equity jurisprudence that he who would have justice must do justice. If the railways will consistently give the public a "square deal," and supply it with information that will show that they are doing so, probably in the long run the public will give them a "square deal." The attitude of intelligent and fair-minded men is illustrated by the foregoing quotations from Professor Potts' book. While such persons favor strict regulation, they do not think that the public should take the pound of flesh to which, by the strict letter of the law, it may be entitled. They see that this would be an immoral act on the part of the public. They see that economically it would harm the public as much as it would the railways. By using every legitimate means to disseminate correct information about railway affairs, by using only legitimate means to influence public opinion and public bodies, and by giving their

patrons good and fair treatment and service, the railways can both increase the number of persons who better understand railway matters and ally with them all who are intelligent and disinterested. The result can hardly fail to be to make railway regulation less harmful economically than it has been. Perhaps it may thus be made as beneficial economically as it has been morally.

DECISION IN THE CHICAGO LIVE STOCK SWITCHING CASE.

The decision of the Supreme Court of the United States in the case of the receivers of the Chicago Great Western *et al* versus the Interstate Commerce Commission settles an important question of law. It also furnishes a strong argument against a proposed change in the Interstate Commerce act.

The point of law to which we refer is whether a railway is entitled to charge a reasonable rate for each service that it renders. This case arose from the action of the railways in imposing in 1894 a switching charge of $2 per car for delivering live stock from the nearest point on their own lines in Chicago over foreign tracks to the Union Stock Yards, in addition to the through rate previously charged from the original points of shipment. The facts in the case are familiar. The commission found that on the basis of the cost of the switching service the charge of $2 a car, considered by itself, was not unreasonable, but that as an addition to the through rate it was unreasonable because it made the combined charges from the shipping points to the Stock Yards excessive. The case repeatedly was before the commission and various courts. At last the United States circuit court for the district of Minnesota, in a decision which was printed in the *Railroad Age Gazette*, July 10, 1908, page 470, held that the carriers had a right to make a separate reasonable charge for the switching service; that the charge of $2 was reasonable; that if there was any unreasonableness in the combination charge it must be in the through rate, and, that therefore, if any reduction should have been made it should have been in the through rate. The commission contended that no rate prescribed by it for any service could be set aside or suspended by a court unless it could be shown that enforcement of the rate challenged would render the carrier's entire business unprofitable. But the circuit court held—and the Supreme Court sustained it—that it could not conceive that Congress ever intended to subject railways to the necessity of an accounting concerning all of their business in order to secure proper compensation for an icing, elevating or terminal service. The railway has a right to a reasonable rate for each service that it renders; each service and the rate charged for it must be considered by itself where discrimination is not in issue.

The application of this to a number of cases pending before the commission is obvious. In the proceeding brought by the Salt Lake Traffic Bureau for a general reduction in rates to Salt Lake, evidence was given regarding the rates on only a comparatively small number of commodities. The complainants contended that, with such fragmentary evidence before it, the commission can and should order reductions in all rates to Salt Lake. But under the decision of the Supreme Court it would seem that the commission cannot reduce any specific rate without convincing evidence that that specific rate is unreasonable. While, viewed from this standpoint, the decision is a victory for the railways, it may be found that the application of the precedent established will often work to their disadvantage. The corollary to the ruling that the commission cannot reduce any rate without showing that on the basis of cost of service that specific rate is excessive, may be held to be that the railway cannot advance any rate without showing that on the basis of cost of service that rate is unreasonably low. It is unfortunate that in this, as in most of our rate cases, the sole test of reasonableness applied, or even considered, was the cost of the service. If the railways in future have this test applied to their hurt they will have themselves largely to blame.

The proposed change in the Interstate Commerce act against which the decision furnishes a strong argument, is that of giving the Interstate Commerce Commission power to restrain an advance in rates. If the commission had had this power, it would have used it some 14 years ago to restrain the railways from collecting a switching charge of more than $1 a car, which was the rate that it held would be reasonable. The roads would thus have been compelled for this long period to accept a rate which now has been held to be unreasonably low, unless they could have got an injunction from the federal court restraining the commission from preventing them from collecting the higher charge. It may be said that if the case had gone against the railways the shippers would have been deprived throughout this period of their right to a reasonable rate. But in that case the shipper could have got reparation. The present law protects both the railway and the shipper; the law as it is proposed to amend it would protect only the shipper, unless, as has been already said, injunctions could be got from the courts restraining unreasonable orders of the commission prohibiting advances.

FUEL ECONOMIES.

While the economy of fuel on railways has for many years been regarded as a work in which great results could be accomplished, the accumulated effects of such endeavor in the past have not perceptibly reduced the opportunity for future achievement. It is estimated by those best informed that it is still possible, by means which are ready at hand, to save 25 to 30 per cent. of the coal used by locomotives in the United States, and at the low price of $1.50 per ton this would represent an annual saving of $45,000,000. Among the reasons why the possibility for such large savings still exist are the fact that locomotive proportions and practice are constantly changing, requiring new investigations to find the best proportions; that the coal supply is changing and its commercial relation to the railways is something which will always bear discussion and reform; that the work of the fireman requires constant attention, and eternal vigilance is the only thing which will keep this up to the high notch of efficiency. The change in railway organization which places the engineer, fireman and road foreman under the jurisdiction of the division superintendent, instead of under that of the mechanical department, has also tended to reduce the amount and quality of the instruction and discipline given; and it is the general testimony of traveling engineers that the quality of the work of the fireman has been deteriorating.

Although the coal production of the United States increases by leaps and bounds, the consumption of coal by locomotives continues to equal more than 20 per cent. of the total output. This represents so many millions of dollars that it is becoming constantly more important that efforts be made to prevent waste by careless firing and train operation. Increased efforts are also necessary to improve locomotive construction and operation so that they will be more economical. That greater endeavors are now made than ever before to effect fuel economies will be rendered manifest by a brief review of the proceedings of the various associations which are working on the problem.

Locomotive fuel economy was the subject of one of the most valuable reports read at the last Master Mechanics' convention, and several members regarded it of so much importance that they suggested that an annual report be made by a standing committe on questions connected with locomotive fuel. While such a committee has not been appointed, the programme for the next convention includes an individual paper on fuel economies by W. C. Hayes, chairman of the for-

mer committee, and superintendent of locomotive operation of the Erie.

The most important discussion at the Denver meeting of the Traveling Engineers was in connection with a paper on "Fuel Economy" by S. D. Wright, of the Central of Georgia. On June 21-23, 1909, the first annual convention of the International Railway Fuel Association was held in Chicago. This association includes in its membership more than 150 men from almost every branch of the railway service—executive, operating, accounting, purchasing and maintenance departments. It also includes a number of coal producers and some members of the engineering profession who specialize as fuel experts. Such a society, with its whole attention directed to the economy of locomotive fuel, should accomplish larger results than have heretofore been obtained from individual workers, or from associations whose interest in the fuel question is incidental.

Next we have the Technological branch of the United States Geological Survey, which, commencing its work in obtaining accurately the heat value of western coals at the laboratory in St. Louis in 1904, has continued to issue its Bulletins which form the most valuable information we have on the technology of coal combustion. The latest of the Bulletins have to do with coal as used in the locomotive; No. 402 relating to the "Utilization of Fuel in Locomotive Practice," by W. F. M. Goss, and Bulletin No. 412 giving the results of tests of run-of-mine and briquetted coal in a locomotive, by W. I. Ray and H. Kreisinger.

With the results of all these earnest endeavors to find methods of saving coal in locomotive practice before him, it is possible for any mechanical officer to inform himself of the various ways in which it can be accomplished, and his knowledge of coal conditions will best direct a selection of the methods which are most needed in his line. Efforts of this kind on the Santa Fe have reduced the coal consumption from 254 lbs. per 1,000 ton miles in 1907 to 209 lbs. in 1909, or 18 per cent., representing more than one and one-fourth million dollars per year. Much of this was accomplished by a closer supervision of the enginemen and an individual engineer's coal account, as well as by the general adoption of the brick arch improvements in the locomotive boiler.

In addition to the ordinary methods of economizing fuel the Master Mechanics' committee recommended "individual fuel records," and a "full and fair accounting," and these are the methods which have been allowed to decline as the control of the enginemen has been taken from the mechanical department. The committee concludes its report by saying: "The best results can be obtained by having the engineers and firemen subject to instruction from the mechanical department only, and for this purpose the traveling engineer should be on the mechanical staff. When this is the case the field work is not divided and much more can be accomplished than when the subject is worked out between two departments."

In Prof. Goss's paper on the "Utilization of Fuel in Locomotives," he presents a heat balance which indicates where the largest and most feasible opportunities are for preventing waste. In his experiments the losses due to unconsumed fuel in the form of front end cinders and from cinders and sparks passing out through the stack amounted to 12 per cent., and it is not unreasonable to expect that a large portion of this loss can be prevented by the use of the brick arch, by a properly proportioned grate area and by greater care in the selection and preparation of coal. The larger item of loss is that due to the high temperature of escaping gases, and this offers an attractive field to those who would improve the efficiency of the locomotive boiler. It has been demonstrated that the front ends of long boiler tubes for ⅓ or ¼ their length are not very efficient in transmitting the heat of the gases to the water, and their place in the shell of the boiler could be more profitably occupied by the tubes of a feed water heater, the difference in the temperature of feed water and hot gases being much greater than with water in the ordinary boiler. In the long boiler shell used on the Mallet locomotives this fact lends itself to the construction of feed water heaters having such a large area that they are very effective in absorbing the heat from the waste gases. There is here also room for a re-heater between H. P. and L. P. cylinders of compound engines, and there is ample room in the smoke box for any desired construction for the superheater. The new designs of boiler for Mallet locomotives, therefore, lend themselves admirably to the utilization of the largest item of loss in locomotive boiler practice, namely, the heat in the waste gases.

NEW BOOKS.

Mechanical World Electric Pocketbook for 1910. Emmott & Co., 65 King street, Manchester. 170 pages; 4 in. by 6 in.; flexible cloth. Price, 12 cents.

This little pocketbook, which is also a diary and memorandum for 1910, has been revised and rearranged in order to give a more orderly sequence. Large additions have been made in the sections relating to electrical lamps and lighting, and 20 new sections, principally relating to firemen and conductors, have been added, and many new illustrations have been introduced. The book is now printed on thin paper of good quality, thus diminishing the bulk and making it more convenient as a pocketbook.

Locomotive Dictionary. Revised 1909 edition. Compiled for the American Railway Master Mechanics' Association by Geo. L. Fowler. 670 pages, 9 in. by 12 in.; 5,266 illustrations. Price, $6. Published by the *Railroad Age Gazette*, New York and Chicago, and by the *Railway Gazette*, London.

This large volume has become the standard book of reference for railway officers in the locomotive department, builders, designers and draftsmen. For the successive revisions the plan has been adopted to retain no drawings for historical purposes and to eliminate everything except present approved practice. This plan is carried out by making each three years what is called a partial revision, which involves a scrutiny of patterns and details with the general end in view, but does not involve the thorough search for detailed drawings of all new types of locomotives, which is called the thorough revision, and is made in alternate three-year periods. The present revised edition issued in December, 1909, is believed to be thoroughly worthy of the original undertaking. The alphabetical dictionary of names of locomotive parts and attachments gives clear definitions and serves the user as a ready reference to any drawing that is desired. The drawings are careful tracings from original blueprints, well made and printed, so that their examination and study is easy and agreeable.

In the latter part of the volume the exhibit of machine tools for locomotive shops is designed to cover the latest and most approved practice. In this connection there is given a study by the distinguished mechanical engineer, L. R. Pomeroy, of the machine tool operations required, working eight hours a day, in making four new consolidation locomotives, eight light repairs and 30 general repairs per month at the Scranton shops of the Delaware, Lackawanna & Western Railroad. It is a thorough piece of work, of high value to any officer looking for shop economies. It might be called an unrelenting piece of work. In an analysis of the results to be expected from machine tools, Mr. Pomeroy has favored no one. In presenting this study, with Mr. Pomeroy's permission, the publishers owe and desire to make a sincere apology for a failure to credit the first serial publication of Mr. Pomeroy's work to the *American Engineer and Railroad Journal.* The files of this widely known monthly railway publication were of frequent value to the compiler in obtaining information of new designs.

Letters to the Editor.

AUTOMATIC BLOCK SIGNAL ASPECTS.

Chicago, Nov. 25, 1909.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The primary object of block signals is to increase the capacity of a railway, in other words, to facilitate traffic. All signals are located with this end in view. Yet, there being many classes of traffic on the same road, slow and fast trains, signals cannot usually be placed, and have not heretofore been designed, to provide for all classes equally well. If signals are so placed as to accommodate fast passenger trains, slow freight trains are likely to be impeded. This because one freight train must follow another so closely, in order to avoid congestion in terminals, that several must of necessity occupy the same block at the same time. The result is that all but the leading train must stop at every block signal. This causes waste of coal at the engine and undue wear on draft and brake rigging. The reason for these stops is, of course, that the signals are so far apart that the freight trains cannot clear the blocks fast enough for each to leave a proceed signal for the following train. Likewise, if signals are spaced properly for slow trains the blocks will be shorter than braking distance for fast trains, and a warning indication will not be given far enough in the rear for the engineman of a fast train to stop at the home signal.

The overlap partially meets the situation. With its use the interval between stop signals can be reduced somewhat and it is not necessary for the first train to proceed so great a distance before leaving a clear signal for the following train as when the overlap is not used. But the overlap introduces an absurdity, requiring, as it does, a stop at a signal when, in reality, it is safe to proceed.

If signals could be placed close enough together to accommodate the slowest trains and yet give a warning to the engineman of a fast train in time to enable him to stop at the entrance to an occupied block the problem would be solved. This could be done by overlapping the caution indications of the signals only. That is to say, repeat the caution indication two or more blocks in the rear. The objection to this expedient is that there would be no distinction between the warning indication for fast and slow trains with either the two-arm two-position or one-arm three-position system of signaling. Therefore the engineman of a slow train would begin to apply brakes at the first caution indication, when it would be unnecessary for him to do so until he had reached the last. Also the engineman of a fast train would never know whether he was expected to stop at the first or second signal in advance. On one road there is a steep grade and here has been provided a system of three-arm two-position signals. The upper arm is controlled by the block immediately in advance, the middle arm by the block next in advance, and the lower arm by the third block in advance. Here a complete set of aspects is provided for three blocks. These aspects are shown in Fig. 1 and are as follows: A, stop; B, proceed prepared to stop at next signal; C, proceed prepared to stop at second signal in advance; D, proceed. If it were necessary to provide for more blocks other arms could be added. However, confusion of aspects and complication of apparatus would soon result. Moreover, three-position signaling is now in vogue and sooner or later it will be necessary to provide the same class of indications as those just described with the modern system of signaling.

Committee No. 1 of the Railway Signal Association has provided a clue to the solution of the problem by recommending a lower arm for all automatic block signals, to be used principally as a marker. Why not make this lower arm serve another purpose as well? Suppose this arm be made to work in conjunction with the upper arm and thereby provide an entirely new set of aspects applicable to mixed traffic? In doing so we evolve two sets of aspects which can be interpreted in several different ways to suit conditions. The first set is shown in Fig. 2. Here the distance between any signal and the second in advance as A C is the braking distance for fast trains; distance between any two signals as D E = braking distance for slow trains. Let × be a train. We have the following aspects: 1.—For fast trains: A, proceed; B, proceed prepared to stop at second signal in advance; C, proceed prepared to stop at next signal; D, stop and proceed to next signal prepared to stop. 2.—For slow trains: A, B, C, proceed; D, proceed prepared to stop at next signal, or A, B, proceed; C, proceed prepared to stop at next signal; D, stop and proceed to next signal prepared to stop. In all of the above interpretations E is stop, no qualification. Here we have the overlap for fast trains and no overlap for slow or for both and the calling-on arm applied to automatic block signaling.

Now suppose in Fig. 2 we consider that the distance between any signal and the third in advance, as B E equals the braking distance for fast trains, the distance between any signal and the second in advance, as A C equals the braking distance for medium speed trains, and the distance between any two signals as C D equals the braking distance for slow trains. Then we have another set of aspects as follows: A, proceed; B, proceed prepared to stop at third signal in advance; C, proceed prepared to stop at second signal in advance; D, proceed prepared to stop at next signal; E, stop.

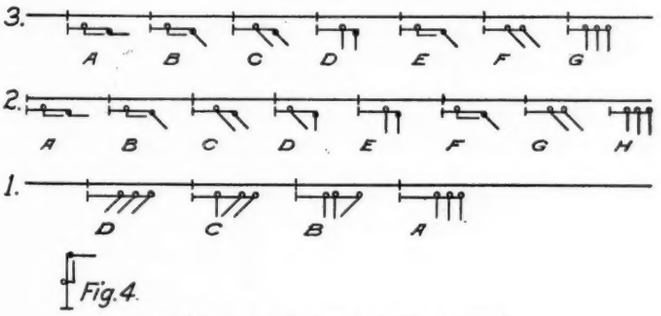


Fig. 4.

Automatic Block Signal Aspects.

Now consider Fig. 3. Here the braking distances are as in the first case considered, viz., distance between any signal and second signal in advance equals braking distance for fast trains; distance between any two signals, braking distance for slow trains. We now have a third set of aspects as follows: A, proceed; B, proceed prepared to stop at second signal in advance; C, proceed prepared to stop at next signal; D, stop. It will be observed that with the aspects shown in Fig. 3 no train will have to pass a red light on an automatic block signal without having first stopped. The same is true of the first case considered under Fig. 2. This feature may appeal to some. It will be further observed that with all the systems described each aspect is distinct from all others and has a separate and definite meaning, in consequence of which fact an engineman is told exactly when to begin to apply brakes. Another feature peculiar to these systems is that the approach to an interlocking signal at stop or clear is shown by an aspect different from all the rest. In other words, the aspects G, Fig. 2, and F, Fig. 3, are different from C, Fig. 2 and Fig. 3. In one case the lights are staggered, in the other they are in line.

Should it be desired to signal one part of a road exclusively for one class of traffic and still keep it consistent with other parts, or if it should be desired to do away with the red light altogether and still provide a marker, aspects A, B, C, Fig. 2, and another, Fig. 4, meaning stop, might be used, or other aspects evolved to meet local needs. It is not expected, however, that Fig. 4 will meet with much approval.

W. H. ARKENBURGH.

THE TURBINE REDUCTION GEAR.

To the Editor of the Railroad Age Gazette:

For more than two years there have been momentous discussions in the parliaments of England, Germany and in the daily and technical press of all countries in regard to the keen competition (especially between England and Germany) in the building of powerful and swift battleships and battleship cruisers; and in the press of this country much has been said as to the necessity for the United States maintaining its relative position in the power and speed of its naval vessels.

Bearing upon this important subject, I am sending you herewith a description relating to the development and perfection of a new marine turbine engine and machinery, which, while costing less and weighing only about one-half as much as the turbine machinery successfully used on British vessels, will effect not only a great economy in fuel, but will also permit of much higher speeds in cases of emergencies. Were the United States Government to apply this type of marine turbine to the large 26,000-ton battleships for which contracts have only just been let, we could have the fastest battleships yet projected by any nation.

The problem presented was that of devising a means of reconciling, in a practical manner, the necessary high speed of revolution of the turbine with the comparatively low rate of revolution required by an efficient propeller. It has been accomplished by Messrs. John A. McAlpine and Com. Geo. W. Melville, by means of a reduction gear, which makes possible any reasonable speed ratio between the turbine shaft and the propeller shaft.

The teeth of the gears are helical; that is to say, they do not run straight across the face of the wheel parallel to the axis as in the case of ordinary spur gears, but they are cut in the form of a steep spiral, like an exaggerated screw thread. This construction allows the teeth to roll into contact without shock or jar. If there were only a single gear on each shaft this helical form of tooth would cause an objectionable end thrust. As the gears must be very wide to transmit the enormous powers required in marine service two gears, each of half the required width, are placed on each shaft, with the spirals of the teeth running in opposite directions. In this way the end thrust due to the obliquity of the teeth is completely balanced. With a pair of wide-faced gears with straight teeth, it is hardly possible to cut the teeth with such accuracy and to aline the shafts so perfectly as to get uniform contact throughout the entire length. Even if it were possible to secure the requisite degree of accuracy at the outset, it could not be permanently maintained on account of the natural wear of the bearings. In general, the conditions are such that a rigidly confined set of gears such as are common for moderate speeds and powers, is altogether inadmissible.

In the design which has proven its sufficiency under severe and exhaustive tests, the smaller gear or pinion is mounted in what the inventors call a "floating frame." The frame which carries the bearings for the pinion is a heavy steel casting supported only at a single point midway between the bearings. This support is flexible so that the frame is free to oscillate in a vertical plane passing through the axis of the pinion, but is held securely against motion in any other direction. Furthermore, the pinion is free to move endwise in its bearings. Any tendency of the teeth to bear harder at one end of the gear than the other would tend to unbalance the respective end thrusts due to the right and left hand spirals of the teeth; but as the pinion cannot present any resistance to unbalanced end thrust, it constantly adjusts itself in the direction of its axis to the position corresponding to equilibrium between the opposing forces. This means that the tooth contact pressures are always automatically equalized.

If there are any minute irregularities in the spacing of the teeth, which would tend to make the contact harder at one point than another in any part of the revolution, this tendency is defeated by the floating frame, the position of which about its central support or fulcrum is controlled solely by the pressures of the teeth of the pinion against the teeth of the large gear. Naturally, the floating frame always yields under the slightest tendency of an unbalanced contact pressure in such a way as to transfer the smallest increment of unbalancing pressure, to another section of the gear that in the absence of the floating frame would be less inclined to take its full share of the stress. In short, the gears are self-adjusting to relieve and equalize all abnormal strains, and are consequently independent of the small inaccuracies that are impossible to eliminate in the best commercial manufacturing operations.

The probable efficiency of the gear was naturally the most anxious question, as the operating conditions were so wholly unprecedented that there were no existing data to enable one to even hazard an estimate. The effect of a low efficiency would be more serious than a mere impairment of the economic performance of the installation, as the transmission losses would manifest themselves in heating and destructive wear that would mean hopeless failure for the scheme in its entirety.

Considering the important bearing of the question of efficiency on the ultimate success or failure of the gear, it is peculiarly gratifying to have found by repeated trial and careful measurement, that the transmission loss hoped for by Mr. Denny, has been divided by seven. To be exact, the efficiency surpasses the more than satisfactory figure of 98.5 per cent., as a result that is without doubt inseparably connected with the flexibility and self-adjusting character of the apparatus.

It is needless to say that the gear is enclosed in a substantial casing, that adequate means are provided for its constant and efficient lubrication, and that the ingeniously designed connections between the gear and the turbine effectually prevent the self-adjusting movements of the pinion from communicating any longitudinal or transverse stresses to the turbine shaft.

GEO. WESTINGHOUSE.

COST OF SERVICE AND VALUE OF SERVICE.

Salt Lake City, Utah, Dec. 8, 1909.

To the Editor of the Railroad Age Gazette:

Letters from J. H. Johnston, Manager Oklahoma Traffic Association, appearing in your issues of November 19 and 26, and your editorial of the former date on the subject of "Cost of Service in Rate Making" prove to be further interesting contributions to the discussion of a most interesting and important subject.

To my mind, the drift toward the "cost of service" theory and the disposition to take refuge in a more or less rigid adherence to the distance tariff principle to escape from the perplexities of the problem constitutes one of the serious menaces to our country's welfare. Mr. Johnston, while he seems well aware that the cost of service plan is impossible for making rates on different commodities for the same distance, and that it is absolutely necessary in that instance for us to do just what we are doing, i.e.: make rates on the basis of value of the service, still cannot bring himself to admit the force of the argument that the same commodity moving under different conditions frequently presents a similar situation which is properly met by the carrier in a similar way. To him our statement that because we make a low rate on some commodities to all markets, for the reason that, owing to the low value of these commodities in all markets, the producer could not otherwise move them, it does not follow that we can duplicate this basis on all commodities, appears perfectly plain and consistent. Yet when we contend that similarly because we make low rates on all commodities to some markets for the reason that,

owing to the low value of such commodities in those markets (caused, for example, by low water transportation from the same or a competing producing point) the producer on our line could not otherwise move them there, it does not follow that we can duplicate that basis to all markets, he tells us that will not do at all. Now, wherein is the difference?

I am inclined to think our difficulty begins with a confusion of terms. I have read many arguments for the cost of service plan, but I have never yet seen one of its advocates who defined which cost he had in mind. It must, of course, always be remembered that there are two bases of "cost of service" in the running affairs of every concern. I mean by that, first—the total cost of conducting the business, the one apparently referred to by Mr. Johnston, which would include general cost of maintenance and administration, taxes, interest, insurance, etc.—all the burdens of the business, in short, including those which remain fixed or approximately fixed whether the plant is operated to full capacity or not—and second, added cost of doing additional business, such as, in railroading for instance, running another train or another car, filling out a train running light or a car which is being operated only partly loaded, securing return loads for cars moving in one direction empty, etc.

As an old railway man it must appeal to Mr. Johnston that added cost as here defined is considerably less in the case of any concern than total cost, and in the case of a railway, the first cost of whose plant as well as the fixed and approximately fixed cost of upkeep is enormous, the difference between the two bases of cost I have mentioned is very consequential, more so than in any other business. A railway has for sale every day a larger surplus capacity than any other concern I can think of; a larger and, for the reason that it must be used each day or be forever wasted, a more perishable surplus. Business undertaken on the added cost basis, whether in a low grade commodity which could not otherwise move to any market, or in any commodity which could not otherwise move to a low price level market, may well pay added cost of doing additional business plus a reasonable profit, and yet be carried at rates decidedly below the figure necessary to provide for total average cost of conducting the concern. They contribute toward that. Such business is not taken at a loss, as some seem to assume, but the same basis applied to the entire business would unavoidably cause a loss. We do not voluntarily take any business at rates below the basis necessary to meet total cost. We do it because we must or lose the business for ourselves, while also circumscribing and hampering the business of the producer who depends upon us for his outlet. Those conditions being demonstrated, we extend our business and that of the producer who looks to us in such matters by undertaking it on the basis of added cost, plus whatever profit in addition to that we can secure; in other words, we sell the service at its value to the producer, so that it be not below added cost of performing it. That is just as true in the case of the low market as of the low commodity. Neither of these are of our making. They are conditions which we cannot control, but to which we must accommodate our business or not only suffer primarily the loss of whatever profit there is in it, but see the territory dependent upon us for its outlet languish in all productive lines and so lose revenues in other ways.

I feel that Mr. Johnston, like you and I, is seeking the truth. With the best of humor, granting his right to challenge my conclusions is in every way equal to my right to challenge his, I would like to ask him what he thinks of the foregoing line of reasoning. I agree with him entirely that the subject is easy enough of comprehension to any painstaking and honest investigator, and I hope to see the number of investigators increase, because only in a proper undersanding of each others' points of view on the part of all of us lies the hope of a just settlement of these controversies. I am sure, also, that I do not lose sight of the aspect of monopoly, in whole or in part, in the transportation business, making it all the more necessary for us to be frank with each other and honest in our judgments of each other. Many features of Mr. Johnston's position assure me that he is one of the kind of men on whom we will have to rely for correct judgment of our matters, so I feel exceedingly anxious to get him to see, if I can, what appeals to me as being unsound in the attitude of the cost of service advocates.

For instance, I cannot agree that the consumer's rights are ignored, and I maintain that we do provide the inlet to the consumer as well as the outlet to the producer. It is impossible to do one without doing the other. The pressure is like that in hydraulics—equal (at least approximately) in all directions. While pressing through our connections for the outlet for our producer, we are subject to the pressure of our connections for an outlet for their producers, which means an inlet for our consumer. The same policy which provides a wide choice of selling market, acting in the opposite direction furnishes a wide choice of buying market, and every consumer, being first necessarily a producer, reaps the benefit of this policy in both ways. It does not follow, of course, that we can attempt to equalize price levels everywhere. That is quite beyond us. There are conditions surrounding some commodities everywhere they are sold, and some commodities at some places where they are sold, which we have to meet as best we can, but which we cannot control. Every business concern finds itself so situated as to a part of its business. No concern, as I have said before, finds it possible to do all its business at the same profit, nor can any concern, any more than we, level all its revenues to the basis of its lowest revenues. Mr. Johnston is a business man and understands those principles. Won't he concede that?

Again, we are entirely agreed with reference to a diversified industry as being more advantageous to a community than entire reliance on one industry, such as farming, as mentioned by Mr. Johnston. We have an industrial agent on our line here doing nothing else but working to that end, and at this time, in addition to some of the most up-to-date and prosperous agriculturalists and horticulturalists in the country, we have such large and important producers and manufacturers as the following: Mining, smelting and refining, stock raising, wool growing, lumbering, foundry and iron working, canning and pickling, paper box making, milk condensing, creamery and butter making, fruit drying, mattress manufacturing, candy manufacturing, paper making, brick tile and sewer pipe manufacturing, lime making, sugar manufacturing, salt producing and refining, oil producing and refining, stone, granite and marble quarrying, plaster making, cement making, flour and feed milling, including alfalfa meal, etc., etc. We want more and are anxious to provide the necessary transportation conditions whenever it is in our power, even when necessary to resort to the added cost basis plus a small profit to accomplish that, if Mr. Johnston and others won't pick out the lowest rate we find ourselves obliged to make in such circumstances and demand that we duplicate the basis everywhere whether the producer's necessity requires it or not. Yes, we want consumers, all kinds of consumers here, to make a profitable home market for a large part of these products. That is what makes a country. But no man can consume who does not first produce, so the way to get consumers is to get producers, and by getting many kinds of them they help to make a market for each other's products. For the surplus, which must go to a distance to other markets, we assist with rates which meet the situation as far as we are able to do so. We often have to figure closely in doing this, and would like to feel that the reason is so apparent that it will appeal to men like Mr. Johnston who will see that it is not fair or just to select the lowest of these rates and try to make it the maximum for all rates. I would like to know whether that does appeal to him or not. We want dealers also; necessarily so, and, having prosperous producers able to buy their wares, we haven't found

much difficulty in getting them. Some of them here are criticizing us in the very way Mr. Johnston criticizes, not always even as fairly as he does, but we think all this sort of discussion is helping toward a better understanding on both sides and so we are looking hopefully toward the future.

F. H. PLAISTED,
Assistant General Freight Agent, Oregon Short Line.

Contributed Papers.

PASSENGER CONDUCTORS AND THEIR EMPLOYERS.*

The train collector system has always been a failure and history will repeat itself until the sociologic conditions are thoroughly and honestly appreciated and the proper remedy applied. * * * Why should a shipper at a competing point expect or demand special privileges from the passenger conductor on a cash basis when a passenger on such train, and why should it be necessary for one department to send a representative to said shipper to placate him because the rules of another department require him to pay full fare and 10 cents additional? Again, why should it be possible for the so-called prominent citizen, or big shipper, or a combination of them, to demand that a passenger conductor be taken out of the passenger service because of loyalty to his employers? In one instance where such demand was acceded to the conductor served a seven years' sentence on freight. All the comfort he received in that time was the information that if the general manager had known him better he would not have acceded to the demand. The conductor should not complain, however, if he gets through a railway career and contracts nothing worse than the plague. * * * Why do people report paying fares to conductors when they do not do so? * * * Why is proof of a conductor's dishonesty impossible? Do you insist that the brotherhood makes it difficult to discharge a conspicuously unfit man? * * * Instead of the so-called dishonest passenger conductor finding a way to be dishonest, the difficulty lies in resisting the dishonest demands made upon them daily, and for which they receive little or no credit. You are correct when you say that the large majority of conductors in the service are honest and trustworthy. In this respect the Order of Railway Conductors will yield to no body of men, not even the highest in the land, the United States Senate.

Referring to the 25 per cent. showing claimed for the collectors, assuming it to be correct, indefinite though the statement be, how will it analyze? Consider, if you please, a system whose passenger earnings amount to $2,000,000 annually, contributed by say 100 conductors. This would indicate that each conductor's income would amount to $5,000 annually without his salary. Surely if this were true, a conductor dismissed after one, five, 10 or 20 years would not be seeking employment flagging a crossing, or a job in a switch shanty the day following dismissal.

It is not impossible to discern a wail in this article, probably inspired by the exposure of a conspiracy on the Great Northern system, on which the bond company is established, by the brotherhood which resulted in not only the reinstatement of the members discharged, but full pay allowance while out of service, amounting to several thousands of dollars. The wage statement is a trifle misleading. The maximum monthly wage of passenger conductors on a few systems is $150. It does not reach that on the majority of systems. The minimum monthly wage of passenger conductors on many systems is down in the neighborhood of $100, and expenses are not allowed them at all. The brotherhood has taken the initiative in the reform desired by all and the full accomplishment of it lacks only the co-operation of the railway companies.

The conductors will not experience an attack of hysteria in the event that a collector should be placed on every train. They will view it with perfect complacency, and rather hope that they may have the benefit of them, during the summer months especially. There is only one unpleasant effect of the train collector, and that is that it advertises to the world that conductors are dishonest and untrustworthy.

It is not believed that any operating official is responsible for the R. A. G. article. Rather it is believed that it is the work of those self-styled bond companies and detective agencies and other criminal producing factories and criminal protective associations whose occupation is threatened by the Order of Railway Conductors' demand for proof.

No system of railway enjoys public confidence and respect to a greater extent than do the Chicago, St. Paul, Minneapolis & Omaha, Chicago & North Western, and C., M. & St. P. There must be reason for this and if the confidence and good will so long maintained between employers and employees is not the chief factor, I do not know what is. This good will was demonstrated not only by the conductors on these systems upon the occasion of the last wage conference at Chicago, but also by the members of the entire brotherhood, covering the full period of its existence. In return for this loyalty and conservatism the passenger conductors are given the short end of the deal and unjustly discriminated against. The comptroller of the Omaha road told the writer that he had found that the reports of the collectors and conductors were just alike and said that he believed that the Omaha had the best class of employees in the country, and also that he believed it had the best class of passenger conductors. * * *

*Extracts from an article in *The Railway Conductor*, by D. E. Hasey, replying to an editorial printed in the *Railroad Age Gazette*, June 11 last, page 1194. Speaking of the employment of collectors or "train auditors," we said: "It is bad discipline and bad morals for a railway to continue in service a body of men which, as a body, it cannot trust. Moreover, this procedure casts a stigma on the large majority of conductors in the service—able, honorable men whose honesty is unquestioned. It looks as if the conductor's brotherhood ought to be considerably more interested in this situation than any other party to it. The brotherhood is not intentionally taking the position of shielding dishonesty, but this is what it comes to, and it is a very bad position to be in. The brotherhood has made it so difficult for an unfit man—even when he is conspicuously unfit—to be discharged on suspicion, that all of its members who run passenger trains, no matter how scrupulously honest, have to be classed as black sheep and have to be denied the responsibility of handling company's funds! Can there be any possible doubt that it is to the interest of the conductor's brotherhood to find some way of removing this stigma?"

FOREIGN RAILWAY NOTES.

President Gomez, of Cuba, has issued a decree nullifying the action of the Cienfuegos City Council in refusing to permit H. J. Reilly's Cienfuegos, Cruces & Palmira railway to enter Cienfuegos. This removes the last obstruction to the construction of the road.

A consular report says that the British political resident at Aden, at the entrance to the Red Sea, Maj.-Gen. E. De Brath, announces that after several years of effort he has finally completed arrangements for the building of a 12-mile steam railway from Tawahi, of Steamer Point, Aden, through the old town or camp, and thence to Shaikh Othoman, the outpost of British territory in Arabia. The surveys and plans of construction have all been worked out, and the concessionaires are now only waiting the approval of Earl Morley before beginning to lay track. The concession for building the road has been divided between a native firm and an English company. The entire cost of construction will be about $400,000. The proposed railway will be the only one in southern Arabia and will naturally be of the greatest service to Aden, whose only present means of communication with the interior is by donkey and camel service. It is expected, however, that the road to Shaikh Othoman may be extended within no great time through the neighboring tribe of the Abdalli to and beyond Lahej, their capital.

CONVERTED MALLET LOCOMOTIVE FOR THE GREAT NORTHERN.

The Baldwin Locomotive Works have recently built, for the Great Northern Railway, a unit specially designed to be placed in front of an existing consolidation engine, thus converting the latter into an articulated compound locomotive of the Mallet type. The consolidation engine referred to was built by the Baldwin Locomotive Works in 1907. Its principal dimensions are as follows:

Cylinders	20 in. x 32 in.
Driving wheels, diameter	55 "
Boiler, diameter	74⅛ "
Steam pressure	210 lbs.
Total heating surface	2,727 sq. ft.
Grate area	59 "
Wheel base, driving	16 ft.
Wheel base, total	24 ft. 3 in.
Weight on driving wheels	188,250 lbs.
Weight total engine	210,350 "
Tractive force	41,500 "

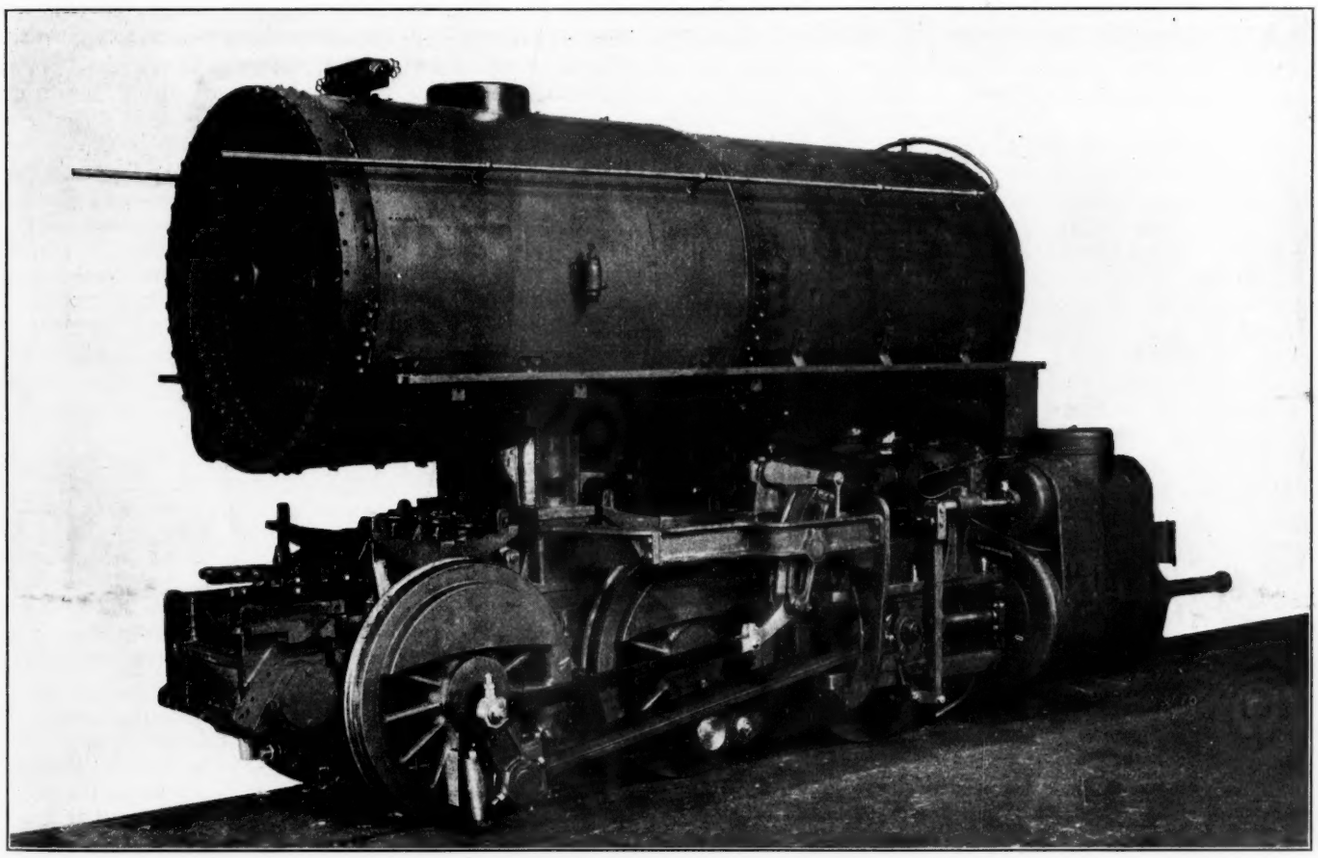
The new unit is carried on three pairs of coupled driving wheels, while the leading truck of the original engine is moved ahead of the low-pressure cylinders. The new boiler section contains a feed-water heater and smokebox. At the back end of the feed-water heater there is fitted an external ring, which is riveted to the shell. A similar ring is riveted to the smokebox of the old boiler, and the rings are butted with a V-shaped fit, and held together by horizontal bolts. This arrangement is in accordance with a patent recently granted the builders.

It is proposed to place a fire-tube superheater of the Emerson type in the original boiler. The existing cylinders become the high-pressure cylinders of the new combination. The steam distribution is controlled by balanced slide valves, driven by Walschaerts motion. The blast nozzle has been removed and the stack hole closed by a suitable cover. A Y-connection has been fitted over the exhaust openings, and this connection communicates with a cast iron elbow pipe. The latter terminates in a horizontal dry pipe, centrally located in a flue which traverses the water heater. This flue is 11 in. in diameter, while the diameter of the dry pipe is 7⅝ in. The furnace gases therefore circulate around the dry pipe, which acts as a reheater. The dry pipe terminates in the forward smokebox and is connected to the flexible receiver pipe by a second cast iron elbow.

In addition to the large flue, previously mentioned, the feed-water heater is traversed by 346 tubes each 2 in. in diameter. These are evenly distributed over the cross section, and measure 8 ft. in length. The heating surface thus provided is 1,451 sq. ft.

The articulated connection between the frames is effected immediately in front of the cylinders of the original locomotive. A steel casting spans the front frame rails at this point and carries the pivot pin, which is embraced by a specially designed radius bar bolted to the front frames. These frames are of cast steel, 4½ in. wide. Immediately in front of the leading driving pedestals they are bolted and keyed to a steel box casting, which serves as a support for the low-pressure cylinders. A cast steel deck plate is bolted to the forward end of the box casting and to the deck plate are secured the front bumper and pilot of the original locomotive. The box casting supporting the low-pressure cylinders is cored out to convey the steam from the receiver pipe to the low-pressure steam chests. Here the distribution is controlled by outside admission piston valves 12 in. in diameter. These are designed in accordance with Great Northern practice for locomotives using superheated steam. Walschaerts valve gear is applied and the links are supported outside the second pair of driving wheels by suitable cast steel bearers. The original hand reverse has been replaced by the Ragonnet power gear, and the valve motions are controlled simultaneously.

The forward overhang of the boiler is supported, on the

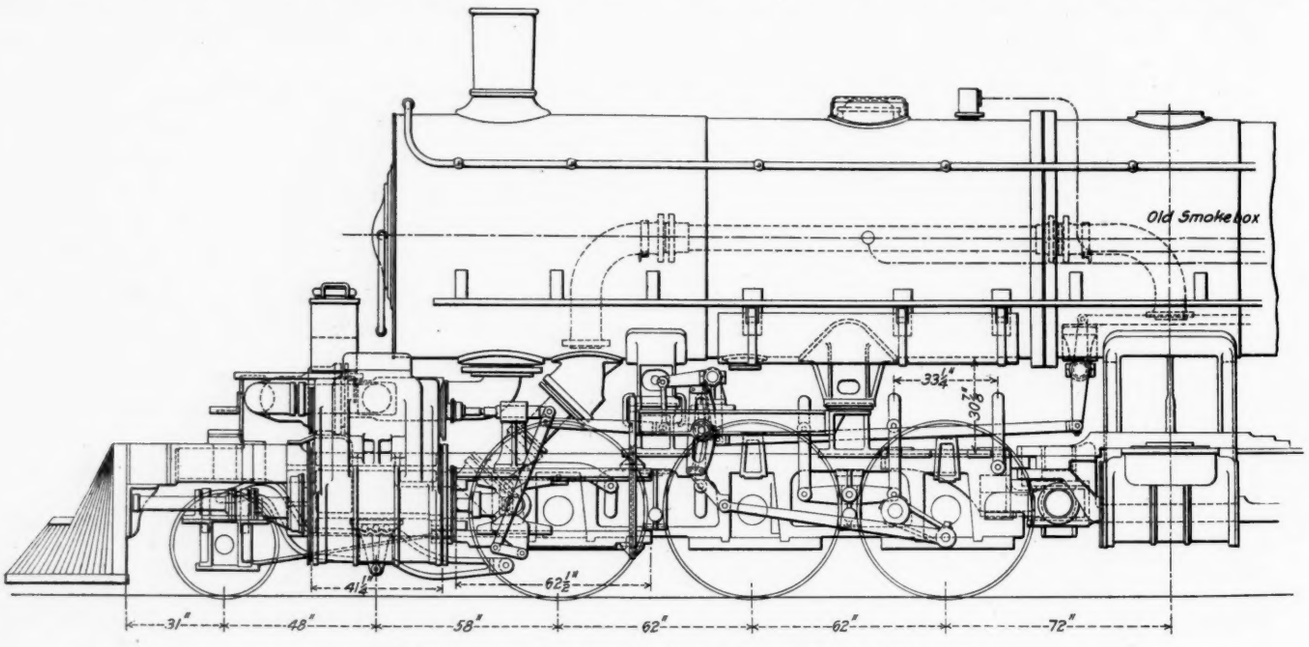


Leading Unit of Converted Mallet; Great Northern.

front frames, by two bearers, both of which have their sliding surfaces normally in contact. The forward bearer is fitted with centering springs and clamps. The equalization of the forward unit is generally similar to that of a mogul locomotive, except that it is continuous on each side. Yoke equalizers are placed over the front driving boxes, and from these is suspended a transverse steel casting. This casting supports an inverted leaf spring, which is connected to the back end of the forward equalizer by a suitable link shown in the drawing.

The driving wheel-base of the new unit is 10 ft. 4 in., and the total wheel-base is 19 ft. 2 in. The total wheel-base of the rebuilt locomotive is 45 ft. 8 in. Approximately 135,000 lbs. are carried on the forward group of driving wheels.

It is expected that the addition of this unit will reduce the fuel consumption per ton-mile by nearly 50 per cent. Of this amount about 10 per cent. may be credited to superheating, 15 per cent. to feed-water heating and the remainder to compounding. This plan of rebuilding provides a feasible method of increasing the effectiveness of existing locomotives whose capacity has become inadequate for the work required. An enormous amount of energy is lost in the exhaust of single-expansion locomotives, especially when working at a long cut-off; and the addition of a low-pressure unit provides an effective means of utilizing a large part of this energy.



Elevation of Leading Unit of Converted Mallet.

TURNTABLES.*

The committee sent circulars asking for the following: 1. Proper length, allowing for probable future increase in length of locomotives. 2. Plate girder tables, and cost. 3. Cast iron tables, and cost. 4. Gallows frame tables, and cost. 5. Other designs, and cost. 6. Foundation, circle wall, paving if any and pit drainage. 7. Power for operation; electricity, air and other power.

The days of cast iron and gallows frame turntables are nearly past. There remain plate girder tables of both deck and through types. One member reports the use of a hinged type of Pratt design, the girders being hinged at center so that ends of table take their share of the load. This table is turned by a 45-h.p. electric motor.

There are many points of interest regarding fastenings for both circle rails and track rails on coping walls which have been brought out in these replies. One detail which seems important, but which has been mentioned by but few members, is that of a recess in the circle wall for examination of the outside of truck wheels. It is a comparatively simple matter to provide such a recess and the opportunity to make examination of wheels is certainly a great convenience for making inspection and repairs.

Three kinds of power are in common use for operating turntables, namely, air, electricity and gasolene. The different elements of loading on table, climatic conditions, frequency of turning, etc., all enter into the choice of any particular one.

Extracts from replies follow:

J. P. Canty (Boston & Maine).—The largest engines on our division are turned easily on turntables 70 ft. long. This is now our standard length, and as far as we are able to predict will answer for future requirements.

The steel work in these tables cost approximately $2,500 on board cars delivered to our road. The design in the customary deck plate girder pattern. We specify that four cast steel end wheels shall be furnished on each end of table and the center pivot bearing shall be of the disc pattern; meaning that the table turns on a composition disc on top of the center cast steel pivot casting, instead of on the familiar roller bearing.

Our turntable center foundations have, of late, been made of concrete, being 10 ft. x 10 ft. on bottom and bearing on piles when there is doubt about the earth being sufficiently solid to carry the maximum load on this area without settling. The bottom course of concrete is generally 2 ft. in depth. The foundation is then stepped to 7½ ft. square by 2 ft. thick, and a granite cap 5 ft. square by 2 ft. in depth is placed on top to receive the cast steel center pedestal.

The circle rail and approach tracks rest on, and are attached to, the masonry by the use of bolts. Pocket casting for pit parapets are made use of to permit the bolts, which hold approach track rails in place, to be changed if damaged. Our standard rail clip is intended to fasten circle rail to masonry and, also, for holding rails on approach tracks to top of parapets.

There are 330 cu. yds. of masonry in our 70-ft. turntable pits. The whole outfit, including turning motor, costs us between $6,000 and $7,000.

*From a committee report to the American Railway Bridge and Building Association.

Practically all of these new outfits have been put in where older and smaller tables were installed, and as the older tables were kept in service just as long as possible so as to avoid delays to engines, our work has always been made more expensive than if new tables were constructed where we would not be handicapped by keeping the old table in use.

We use gasolene power turning device.

The floors of the turntable pits are covered with a coal-tar concrete paving, about 2½ in. thick, somewhat similar to that which is used extensively in small cities and towns in New England for sidewalk surfaces. This gives a fairly hard and elastic surface, and does not crack when soil underneath heaves with frost, and is comparatively smooth, so that it is easily kept clean and snow may be removed from pit without much trouble. The cost is about 50 cents per square yard.

H. A. Horning (Michigan Central).—I prefer a deck steel-plate table, if the conditions are favorable for drainage; if not, a half-through table should be substituted. We are using tables of this kind 85 ft. in length, but 90 ft. would be better.

Great care must be taken relative to the depth of girder to prevent deflection. The full load should be carried on the center, and conical rollers should be used instead of discs. The end bearings of table should have rollers instead of sliding plates. Center foundation should rest on natural rock, or piling, capped with suitable concrete block. Coping wall should be concrete on a suitable foundation, and capped with timber instead of curved rail. Pit should have cement floor and be properly drained.

If possible electrical turning device should be supplied. If electricity cannot be had, gasolene is the next best method. Electric current for operating turntable should be brought in beneath the table, and the table should be well lighted.

In this territory we do not find it necessary to cover the pit.

A. H. Beard (Philadelphia & Reading).—The cost of a plate girder standard 75-ft. table in place ready for the track rails is $7,785, as follows:

Masonry	$2,500
Miscellaneous	500
Table	4,785
Total	$7,785

A 65-ft. plate girder table has been in service at the roundhouse at Reading since 1897. This was manufactured by the Pottstown Bridge Company. Engines of all classes are turned on this table, the number turned every 24 hours (although the table is short for some engines) is 75 to 80. The cost of this table in place was $5,825.

This table at present is operated by an 8-h.p. gasolene engine, manufactured by the Williamsport Gasolene Engine Company; the cost of same in place was a fraction over $1,000, and costs for operating about $165 per month; this includes labor, oil, gasolene and repairs. We are now arranging to install an electric motor on the same table to replace the gasolene engine.

The turntable referred to is in the roundhouse and the space will not admit a 75-ft. table.

F. E. Schall (Lehigh Valley).—The 80-ft. table is made of deck plate girders 5 ft. 6¼ in. deep at center and 2 ft. 8¼ in. at ends, spaced 6 ft. center to center, conical wheel center bearings with live ring, built for a moving load of Cooper's E. 50 engines, or 4,500 lbs. per lineal foot of table. Cost about $3,200 delivered f.o.b. cars within 200 miles of bridge shop.

The center foundations and circular rim walls are generally of concrete, the circular rail resting on short sawed ties. The top of rim is covered by a white oak timber coping to act as a cushion with rail tie-plated. The pit is paved with concrete about 6 in. thick, and provided with drainage. For outlying districts, and tables not used extensively, the rim wall is at times omitted, using only a segmental wall at entrance and run-off of table, using ballast under the ties of circular rail.

For operation we have in use electric motors, gasolene engine motors and air motors; all are giving satisfaction. When electric power is at hand it is the most suitable power to use; when electric current must be purchased from other parties or when none is available, gasolene engine motors of from 8 to 10 h.p. will prove very satisfactory. The air motor will also prove efficient if properly installed and arranged to take proper adhesion on circular rail, obtaining a sufficient supply of air from locomotives to be turned, unless the air can be taken from a compressor near by. The air motor will not turn as many engines in a given time as either of the other two kinds, on acount of the time required in making couplings, but for outlying districts it is the best motor attachment available at this time. The cost of installing one of the motors ranges from $900 to $1,200.

Moses Burpee (Bangor & Aroostook).—I think that 70 ft. length of turntable would be necessary for heavy locomotives for general use. Sometimes such length is necessary for cars, but usually it is not the length of wheel base which determines the length of turntable so much as their position in balancing on the table.

In one case, a 70-ft. turntable installed, including masonry of foundation and ring, as well as drainage, cost about $4,500.

Usually find drainage of turntable necessary, and provide for it in all of our plans.

Do not as yet use any kind of power for operating.

A. A. Wolf (Chicago, Milwaukee & St. Paul).—We use 85-ft. turntables on mountain division where the heaviest power is used, and 75-ft. tables on other main line divisions.

We have three types of the plate girder tables, which we distinguish as through, semi-through and deck. The reason for these various designs is occasioned by the difficulty in many places of getting drainage from the pit to a sufficient depth to accommodate a deck table. These plate girder tables cost from $6,000 to $8,500, varying somewhat with local conditions, pertaining to the nature of foundations, etc. The labor amounts to from 35 to 40 per cent. of the total cost.

For plate girder tables we use a concrete center pier, circle wall and circle rail foundation, the circle wall and foundation for circle rail being of monolithic construction. Piles are always used under center foundation, except at places where solid ledge rock is found. Piling is used under circle wall except where rock or other firm soil is found. We do not make it a practice to pave the pits. Drainage is provided by means of connection to roundhouse sewer or to low adjacent ground, according to local conditions.

We use gasolene and electric motors only for power; the electric motor, in our estimation, furnishes the ideal power for turntable operation where it can be procured without excessive cost. At several of our division points we have our own generators and consequently the current required for operating turntable costs but very little.

I. O. Walker (Nashville, Chattanooga & St. Louis).—Our standard length is 70 ft. Plate girder tables cost with ties, latches, etc., in place $3,200. Masonry and foundations $2,000. The cost of the masonry is extremely variable, however. We have only one gallows frame turntable in use. This was purchased some 18 years ago during the construction of one of the branch lines and has been moved four times and rebuilt twice; original cost unknown. It is an exceedingly unsatisfactory table.

We are doing away with turntables wherever we can, substituting Y's in place of them, even when the cost of right of way is considerable.

We have no power-operated turntables on our road, although we have arranged openings for air connections to motors if we decide to use them.

W. T. Main (Chicago & North Western).—Turntables newly installed in the future should be 80 ft. in length. A 70-ft. King Bridge Co. deck plate girder turntable which was in-

stalled at Chicago avenue, in 1907, cost as follows:

Material	$2,570.46
Labor	2,262.00
Total	$4,832.46

This table replaced an old 60-ft. deck plate girder and was installed under continuous traffic except for two days while new concrete center pier was allowed to set. Over 400 engines were turned every 24 hours on old table during construction of new circle wall, which will give some idea of conditions under which work was done and reason for high cost. Table is operated by 10-h.p. electric motor which was used on an old table but furnished with new frame. A 70-ft. King Bridge Co. deck plate girder turntable installed in 1907 cost as follows:

Material	$2,890.00
Labor	2,490.00
Total	$5,380.00

This table replaced an old 60-ft. Lassig plate girder and was installed under traffic in same manner as the one before mentioned. About $500 of the cost was due to renewal of radial tracks. The circle wall was built of concrete and the center pier of concrete, reinforced with scrap rails in order to spread the load over old masonry foundation. The table is operated by 10-h.p. Pilling air motor and has six reservoirs under runways, the air being furnished by air compressor.

A 60-ft. Stroebel deck plate girder table installed at Chicago avenue in 1899 on old masonry wall and new center pier cost $2,520. Sixty-ft. Greenleaf cast iron table installed at Milwaukee, 1899, including new center pier, cost $3,100; the table alone cost $1,160.

A 50-ft. gallows frame turntable installed at Evanston in 1896 with timber circle wall and center pier cost $983.

Circle walls should preferably be built of concrete except when table is renewed under traffic, where rubble masonry can be used to better advantage while working in cramped space. Center pier may require pile foundation unless subsoil is good, where a spread foundation of concrete or masonry 12 ft. square will serve. The advantage of paving in pit will hardly justify the additional expense, though it is easier to keep pit clean when paved and helps the drainage. The best drainage possible should always be secured. Circle walls should have an offset at one point to allow of examination and repairs to end rollers and boxes, particularly where table has rollers between girders. Masonry circle rail seat should be extended at two points, diametrically opposite, to afford support for jacks for raising table and examining center. This saves placing cribbing on soft ground when using jacks and renders the operation much safer.

Would recommend the use of electric motor for operating table wherever possible and where service demands the quick handling of engines; second choice, gasolene engine; third choice, air motor. The latter gives excellent service where there is plenty of time for handling engines and where there is sufficient supply of compressed air which can be piped to reservoirs, but it is slow in operation where engine to be turned must supply the air.

B. J. Sweatt (contractor, Boone, Iowa).—For western railways using the larger types of locomotives, I do not consider that the length of table should be less than 75 ft., and 80 ft. would be preferable where the tendency is to an increase in the length of locomotives and tenders.

The foundation for a table is, in my opinion, very important; piles should be driven in all cases where solid rock, hard clay or cemented gravel is not found. The piles for center foundation should be spaced not more than 36 in. apart and the number of piles should not be less than 20. Concrete is about the best and at the same time the cheapest material that can be found on which to rest the center casting. The depth of this should be not less than 4 ft. below the surface of the ground in the pit. The circle wall should have a good pile foundation, made of concrete, stone or vitrified brick, extending at least 4 ft. below the surface of the pit. Turntable pits should always be paved, either with brick or an equal thickness of concrete.

Pit drainage is very important; the size of the drain should be not less than 6 in. in diameter and it should have a fall of not less than 2 in. in 100 ft. The inlet should be at a depth of 1 ft. below the lowest part of the pit and should be provided with a good cast iron grating.

In countries where there is liability of snow storms, it is economical to provide a cover for the entire pit; unless this is done the cost of operation will be excessive and the delays in turning the power will be many. This covering can be made in sections of 1-in. boards and supported on a light frame work of timber or iron in such a manner as to be easily removed when not required.

Where electric power can be obtained at a reasonable rate, an electric motor can be used, as it is not as necessary to have an experienced man to run it and the cost of operating will be very small as compared with the loss of time of roundhouse men, extra help and the saving of time in turning.

A. O. Cunningham (Wabash).—A turntable should be not less than 75 ft. Deck tables of this length cost $2,600.

Foundation of circular wall and paving should always be of concrete; pit should be well drained; the cost of this for 75-ft deck table would be $3,700.

Electricity is the ideal power for operating a table. If this cannot be obtained a gasolene engine may be employed of about 6 h.p. The cost of the electrical equipment would be $1,150, and for the gasolene engine equipment $1,000.

A. Montzheimer (Chicago, Lake Shore & Eastern).—There is no wood coping on the circle wall and no ties for the circle rail on a 70-ft. table recently installed at Gary, Ind., which we consider sufficient for all future requirements. We used 150-lb. rail for the circle. The table is of Pratt design, the girders being hinged at the center so that the ends of the table take their share of the load. The table is turned by means of a 45-h.p. electric motor.

W. H. Moore (New York, New Haven & Hartford).—The standard length for turntables on our road is 75 ft., but we build some tables 80 ft. long.

The approximate average cost for a 75-ft. deck plate girder turntable is about $3,500, and for a half-through plate girder turntable about $5,750.

The cost of foundation of the circular wall, etc., varies so much, depending on the nature of the ground, that it would be hardly proper to name any average. For a concrete pit with granolithic floor and granite center stone, in a location where there was good firm sand requiring no piles and where drainage could be cheaply taken care of, the total cost is about $3,800.

For power operation we use mostly gasolene motors; some air motors, and electric motors where current can be conveniently obtained. The cost of power installation averages about $1,000.

G. Aldrich (New York, New Haven & Hartford).—For the requirements of modern engines, 75-ft. minimum; 80-ft. recommended. A 75-ft. deck plate girder, erected complete, $3,600, base of rail on table to top of center pier, 6 ft. 4 in.; base of rail on table to top of circular rail, 4ft. 8 in.

A 75-ft. through plate girder, cost with floor erected complete, $5,750. Base of rail on table to top of center pier, 3 ft. 11 in.; base of rail to top of circular rail, 2 ft. 9 in.

The foundation, circular wall and center pier are constructed of concrete; the pit is usually paved with granolithic pavement. The cost varies in accordance with local conditions, ranging from $2,500 to $4,000. For power we use: Air supplied by the engine while being turned; air supplied from compressors in adjacent shops; gasolene engines; electric motors. Electric motors preferred where current is available; air motors, supplied by compressors, second; and gasolene

motors third choice. The cost of power installation varies from $900 to $1,200.

C. F. Loweth (Chicago, Milwaukee & St. Paul).—On our Pacific coast extension, west of the central portion of Montana, we are using 85-ft. tables, figuring that these will be of sufficient length to accommodate the Mallet type locomotives, should we ever have occasion to use them on the several mountain divisions.

Between central Montana and the Missouri river we are using 80-ft. tables, and the new ones on the old lines of our road are 75-ft.

N. F. Helmers (Northern Pacific).—We are installing 80 and 85-ft. tables. I do not anticipate any power in the future which will call for the use of a larger table.

An 80-ft. through table, without the circle rail, and weighing 114,855 lbs., cost in place $4,600. Such a table was installed at Staples, Minn., with concrete circle wall and center foundation. The masonry was done by contract, and the installation of the table by the company at an expense of $3.92 per ton. The framing of ties and other timber cost $4.05 per thousand feet. The cost was as follows:

	Labor.	Material.
Turntable	$211.44	$4,198.52
False work	.....	12.93
Timber, ties, planking, etc	35.23	77.49
Painting	27.49	44.78
Total	$274.16	$4,333.72

Total cost (not including masonry), $4,607.88.

In 1908 an 80-ft. table of the same type was installed at Minneapolis, replacing one 64 ft. in length. The foundation work was done under traffic, and the change of tables was done with a total interruption of 15 hours; itemized statement follows:

	Labor.	Material.
Excavation	$463.94	.....
Gravel	92.14	.....
Concrete work	408.28	$651.52
Forms	21.76	134.19
Circle rail	38.74	.....
Table proper	361.36	4,040.95
False work for curbing	.....	66.36
Removal of old brick curbing	104.42	.....
Cleaning girders	37.98	.....
Painting	23.76	21.04
Ties and coping	79.71	188.89
Engineering	.....	14.66
Total	$1,632.09	$5,117.61

Total cost, $6,749.70.

I consider that ordinary conditions do not require the necessity of paving for the pit, but good drainage is essential in most cases.

For power we are using electricity and compressed air, while some of the 80 and 85-ft. tables are being turned by hand.

Air motor in use at Jamestown, N. Dak., cost at St. Paul $450; installation, $19.81; total, $469.81.

Electric tractor furnished by Nichols & Bro. cost $1,104,37; installation, $115.86; total, $1,220.23.

W. T. Powell (Colorado & Southern).—The up-to-date table should be 80 ft. long, with a capacity for turning 200-ton engines.

We installed recently an 80-ft., 200-ton, through-plate girder table which cost as follows:

Table f. o. b. Denver, including circle rails	$3,700
Material for concrete foundations and walls	1,090
Labor	1,600
Total	$6,390

This table replaced a 66-ft. table and we were compelled to excavate and put in the curbing under 42 tracks and keep them safe while in use. We drove 24 piles for center foundation and capped it with a block of concrete 12 ft. square and 4 ft. thick; a deck table of this length and capacity would cost about $600 less.

We use concrete entirely for masonry; rails are fastened with bolts and cast clips, the bolts being set in the concrete; no paving; drained when necessary.

We use air power with a two-cylinder motor.

J. S. Browne (New York, New Haven & Hartford).—We installed an 80-ft. table at Providence. The center pier is of concrete, reinforced with steel rails, on account of the irregularity of the supporting material, as it was feared that the concrete might be fractured by the load if laid without reinforcement. The outer wall of the pit and the paving are also of concrete. The cost was approximately as follows:

80-ft. steel table delivered at Providence	$3,400
Placing coping and circular rail and moving table into pit	800
Concrete in outer wall and center, including forms	2,800
Excavation, including disposal of material	1,500
Paving	300
Drain pipe to connect with sewer	200
Total	$9,000

The work was done by the company's force, and the high cost of excavation was due to the fact that a portion of the work was done in freezing weather, and it was necessary to handle the material more than once before its final disposal by work trains.

The table has not been equipped with power, but a gasolene engine will probably be attached later.

The company's standard main line turntable is 75 ft. long, but 80 ft. is considered better at points where the largest type engines are turned, to permit of properly balancing them.

Deck plate girder tables are used where sufficient depth is available without excessive cost, but where this is not feasible half-through plate girder tables are used.

The superstructure of deck tables is about 30 per cent. cheaper than that of half-through tables, but this saving is balanced by the greater cost of the pit, so that under ordinary conditions the total cost of these two types is about equal.

Gasolene motors are generally used for power, although electric motors may be used to considerable extent in the future.

J. N. Penwell (Lake Erie & Western).—On our main line we are taking out 62-ft. tables and replacing with 80-ft. tables, using the old ones on the branch lines. We have two of the old cast iron tables, 50 ft. in length, which have been in use 20 years, one of which is in perfect condition and the other about worn out. We have only one of the old-style gallows frame tables, but it is out of date and will be replaced with a more modern structure within two years. For the foundation and circle walls we are using concrete. If foundation is not absolutely reliable we drive piles. Drainage is important and the very best should be provided. Our tables are all operated by hand, except one which we are now operating with air. Would recommend electricity wherever it can be had. In erecting new tables we make provision for air pipes in the foundation, so that we can use air in the future if we desire.

NEW YORK TUNNEL EXTENSION OF THE PENNSYLVANIA RAILROAD; CROSSTOWN TUNNELS.*

BY JAMES H. BRACE AND FRANCIS MASON,
Members, Am. Soc. C. E.

In this paper, it is proposed to describe the construction of the tunnels extending eastward from the easterly extension of the terminal station to the permanent shafts east of First avenue.

They were located under Thirty-second and Thirty-third streets from the station to Second avenue, and thence, curving to the left, passed under private property and First avenue to the shafts, as described in a preceding paper. Typical cross-sections of the tunnels were shown with Mr. Noble's paper.

On May 29, 1905, a contract was entered into with the United Engineering & Contracting Co. for this work; it provided that work on each pair of tunnels should be carried on from two shafts. The First avenue shafts were located just east of that avenue and directly over the line of the tunnels; the other two, called the intermediate shafts, were on

*From a paper presented before the American Society of Civil Engineers on December 1. Published in *Proceedings* for October, 1909, page 1016.

private property to the north of each pair of tunnels in the blocks between Fourth and Madison avenues. It was originally intended to do all the work of construction from these four shafts. Workings were started both east and west from the intermediate shafts, and those to the west are to be continued to the terminal station. After the change of plans described in a previous paper, it was decided to sink a third shaft on each line. These were known as the west shafts, and were located between Sixth and Seventh avenues. Finally, it was found necessary to build a portion of the tunnels on each line west of Sixth avenue in open cut.

The First avenue shafts were built by S. Pearson & Son, Inc., for the joint use of the two contractors. While the shafts were being sunk, the full-sized tunnels were excavated westward by the contractor for the river tunnels for 50 ft., and top headings for 50 ft. farther. By this means, injury to the caissons and to the contractor's plant in the shafts by the subsequent work in the cross-town tunnels was avoided. The west half of the shaft was for the exclusive use of the contractor for the cross-town tunnels.

CONTRACTORS' PLANT.

Excavation was usually carried on by modifications of the top-heading and bench method, the bench being carried as close to the face as possible in order to allow the muck from the heading to be blasted over the bench into the full section. The spoil was loaded into 3-yd. buckets (designed by the contractor and hereinafter described), by steam shovels operated by compressed air, and hauled to the shafts by electric locomotives. Electrically-operated telphers, suspended from a timber trestle, hoisted the buckets, and, traveling on a mono-rail track, deposited them on wagons for transportation to the dock. Arriving at the dock, the buckets were lifted by electrically-operated stiff-leg derricks and their contents deposited on scows for final disposal. The spoil was thus transported from the heading to the scow without breaking bulk.

When concreting was in progress, the spoil buckets were returned to the shafts loaded with sand and stone. The concrete materials were deposited in storage bins placed in the shafts, from which they were fed to the mixers located at the foot of the shaft about on a level with the crown of the tunnels. The concrete was transported to the forms in side-dump, steel, concrete cars, hauled by the electric locomotives.

Electrical power was adopted largely on account of the restricted area at the shaft sites, where a steam plant would have occupied considerable space of great value for other purposes. The installation of a steam plant at the intermediate shafts, which were in a high-class residential district, would have been highly objectionable to the neighboring property owners, on account of the attendant noise, smoke, and dirt, and, in addition, the cost of the transportation of fuel would have been a serious burden. Except for the forges and, toward the last, the steam locomotives, not a pound of coal was burned on the work. The use of the bucket and telpher also eliminated most of the objectionable noise incident to the transfer of spoil from tunnel cars to ordinary wagons at the shaft sites. Power plants were installed at the north shaft near First avenue and at the rear of the Thirty-third street intermediate shaft.

First Avenue Plant.—The power-house at the corner of Thirty-fourth street and First avenue supplied compressed air for operating drills, shovels, pumps, and hoists in the tunnels driven from the river shafts, and in it three Laidlaw-Dunn-Gordon compressors were installed. The largest was a 32x20x30-in., two-stage, cross-compound, direct-connected to a Fort Wayne 480-h.p., 230-volt, direct-current, constant speed motor run at 100 r.p.m. This compressor was rated at 2,870 cu. ft. of free air per minute at a pressure of 100 lb. It was governed by throttling the suction, the governor being controlled by the pressure in the air receiver and the motor running continuously at a constant speed. The two others were of similar type, one was 22½x14x18-in., rated at 1,250 cu. ft. of free air at a pressure of 100 lb., the other was 16x10x18-in., rated at 630 cu. ft. They were fitted with 9-ft. fly-wheels, and were driven at 150 r.p.m. by 105 h.p. motors, General Electric, 220-volt, compound-wound, direct-current motors running at 655 r.p.m. The larger of these two compressors was driven by two of the motors belted in tandem, and the smaller was belt-connected to a third motor. The compressors were water-jacketed and had small inter-coolers, the water supply for which was itself cooled in a Wheeler Condenser & Engineering Co.'s water-cooling tower. The pump and the blower operating it were electrically driven.

The telphers, used for hoisting muck from the tunnels and for lowering supples, were each hung from single rails on a timber trestle, about 40 ft. high, spanning and connecting the two shafts. One machine was provided for each shaft, and where their tracks crossed Thirty-third street they were separated sufficiently to permit the machines to pass each other. At this point, and covering the street, a large platform was provided, on which the trucks were loaded and unloaded, and from which they descended by an incline on First avenue leading south to Thirty-second street. The platform also covered practically all the yard at the south shaft and materially increased the available working area. The telphers were built by the Dodge Cold Storage Co., and were operated by a 75-h.p. General Electric motor for hoisting and a 15-h.p. Northern Electric Co. motor for propulsion. Their rated lifting capacity was 10,000 lbs. at a speed of 200 ft. per min.

The carpenter shop and machine-shop, both of which served the entire work, were conveniently located in small buildings on the loading platform. In the former the saws were each run independently by small electric motors suspended under the platform. The heavy forms and form carriages used in lining the tunnels with concrete were fabricated and stored on the platform outside. The machine-shop lathes, etc., were all belted to one shaft driven by an 8-h.p. General Electric motor. Above the machine-shop was a locker-room and below it on the street level was the main blacksmith shop for the work. Subsidiary blacksmith shops were located at each of the other shafts. The storeroom and additional locker-rooms were located above the power-plant in the north shaft yard, and isolated from the other structures was a small oil-house. Additional storage space was provided by the contractor on Thirty-second street just west of First avenue by renting three old buildings and the yards in the rear of them and of the railway company's cement warehouse adjacent. Here electric conduits, pipe, castings, and other heavy and bulky supplies were stored.

During excavation the headings were supplied with forced ventilation through 12-in. and 14-in. No. 16, spiral-riveted, asphalted pressure pipes, canvas extensions being used beyond the ends of the pipes. A No. 4 American blower, located at the top of each shaft and driven by a 15-h.p. General Electric motor, supplied the air.

A concrete-mixing plant was placed in each shaft, the mixer being located high enough to discharge into cars at about the level of the springing line of the arch. Above the mixers were the measuring hoppers set in the floor or a platform which was large enough to carry half a day's supply of cement. At the south shaft the cement was delivered to this floor from the loading platform through a spiral steel chute; at the north shaft it was lowered in buckets by the telpher. The sand and stone were drawn into the hoppers through short chutes from the base of the storage bins which occupied the remaining height of the shaft, about 50 ft. At the south shaft, the bins were of concrete and steel, about 6x12 ft. in section, and attached to the central wall of the caisson. Sand and stone were delivered into them from dump-wagons on the loading platform. At the north shaft, steel-plate bins were used, and were supplied with material by the buckets handled by the telpher. The mixers were No. 5 Smith, belt-connected

to 25-h.p. motors, and about 0.8 cu. yd. of concrete was mixed at a batch. The concrete cars were steel side-dumpers of the Wiener or Koppel type.

To continue concreting during the winter, when neither sand nor stone could be obtained by water, practically all the space under the loading platforms in the south shaft yards not occupied by the blacksmith shop was filled with these materials, which were placed in storage in the late fall.

Intermediate-Shaft Plant.—The air-compressing plant was located at the rear of the Thirty-third street intermediate shaft, and supplied air for driving the tunnels east and west from the intermediate shafts on both Thirty-second and Thirty-third streets. Two compressors, the same as the large Laidlaw-Dunn-Gordon machine at First avenue, were installed here, with a similar water-cooling tower.

Both shafts were on private property, owned by the railway company, on the north side of the streets, and each was equipped with two telphers supported on timber trestles, similar to those at First avenue. Here, however, the buckets were placed on wagons standing at the curb.

Blowers for ventilation were installed at each shaft, as at First avenue, and, after the excavation had proceeded some distance, small blacksmith shops, for sharpening drill steel and making minor repairs, were located in the tunnels near the shafts.

The concrete plant in each shaft was similar in arrangement to those at First avenue, but the storage bins had wooden walls made of 2-in. x 4-in. and 2-in. x 6-in. scantling nailed flat on each other.

The contractor's office on Thirty-third street backed up against the Thirty-second street shaft site, and the basement was used as a storeroom for supplies for both shafts.

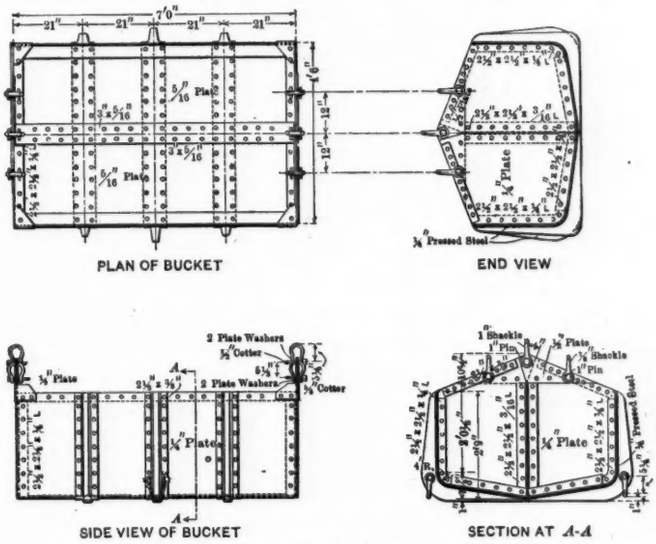
After the decision to do part of the work between Sixth and Seventh avenues in open cut, an 8-in. air main was laid in Thirty-third street to the west shafts, and air was supplied from the intermediate shaft for work on both streets in that neighborhood.

West-Shaft Plant.—West of Sixth avenue, between Thirty-second and Thirty-third streets and adjacent to the open-cut sections, the railway company obtained from the Hudson & Manhattan Railroad Co. the use of a large area from which the buildings had recently been removed, and gave the use of it to the contractor. This was of great value in prosecuting the west end of the work. The two west shafts were located in the streets and were supplied with short timber trestles similar to those at the intermediate shafts. One telpher was taken from each of the intermediate shafts to operate at each of the west shafts. In addition, a number of stiff-leg derricks were set up along the open-cut section, and were operated by Lidgerwood or Lambert air hoisting engines, or by electric motors, as circumstances dictated. A 15-ton Bay City locomotive crane was also used along part of the open-cut work on Thirty-second street.

Several concrete plants were installed at points along the open-cut section, and were moved from place to place, the same general arrangement being adopted as at the plants already described. No. 3 and No. 4 Ransome mixers were used, and were generally set up at about the level of the top of the arch. The sand and stone storage bins were made of scantlings spiked together, and were necessarily rather shallow on account of the proximity of the tunnels to the street surface.

Thirty-fifth Street Pier.—For the receipt and disposal of materials at the Thirty-fifth street pier, four stiff-leg derricks, operated by electric hoisting engines, were installed. Two were used in lifting the muck buckets from the wagons and dumping their contents on the scows for final disposal; and the other two were fitted with clam-shell buckets for unloading sand and broken stone from barges and depositing the materials in large hoppers, from which they were drawn into wagons for transportation to the various concrete plants. A large part of the cement (all of which was supplied by the railway company) was also unloaded at the Thirty-fifth street pier and hauled directly to the work, the surplus being stored temporarily in the company's cement warehouses on Thirty-second, Thirty-third and Thirty-fifth streets, near First avenue, and from which it was drawn as required. On the dock was located the main powder magazine, a small concrete structure. Considerable use was also made of neighboring piers for unloading electric conduits, lumber, steel, etc.

Tunnel Plant.—The spoil buckets, designed by D. L. Hough and George Perrine, Members, Am. Soc. C. E., were a novel feature of the work. These buckets are shown in detail herewith. They were of 3 cu. yd. capacity and were split longitudinally, the two halves being pinned at the apeces of the ends. For lifting, they were suspended from eyes at that point, and, when dumping, trip ropes were hooked into eyes at the bottom of each side; lifting the trip ropes or lowering the hoisting rope split the buckets and dumped the contents. They were transported in the tunnel on flat cars, and in the street on wagons, both cars and wagons being provided with cradles shaped to receive the bottom of the bucket.



Special Bucket.

In the tunnels, the loading was done with air-operated steam shovels, four Model 20 Marion shovels being used at various points of work. The cars were hauled by General Electric standard 10-ton mine locomotives, the current for which was taken at 220 volts from a pair of No. 00 copper trolley wires suspended from the roof of the tunnel. The collector was a small four-wheeled buggy riding on the wires and connected to the locomotive by several hundred feet of cable wound on a reel for use beyond the end of the trolley wire. Two 8½-ton Davenport steam locomotives were also used in Thirty-second street, toward the end of the work, after the headings had been holed through, and the tunnels would quickly clear themselves of gas and smoke. The steam shovels were supplemented by two Browning 15-ton locomotive cranes, which handled the spoil in places where timbering interfered with the operation of the shovels. All tracks were of 3-ft. gage throughout and laid with 40-lb. rails.

Nearly all the heavy drilling was done with Ingersoll drills, Model E 52, the trimming being largely done with Jap and Baby drills. A large number of pumps were used at various points on the work, and nearly all were of Cameron make, the largest ones at the shaft being 10x5x13-in. The grout machines were of the vertical-cylinder, air-stirring type.

SHAFT SINKING.

The sinking of the intermediate shafts was the first work undertaken by the contractor. The Thirty-third street shaft was 34.5 ft. long, 21 ft. wide, and 83 ft. deep. The rock surface averaged 5 ft. below the ground surface. Sinking was started

on July 10, 1905, and was completed on October 3, 1905, the rock being hard and dry. The average daily rate was 0.73 ft., and an average of 17.1 cu. yds. was excavated per day, with two shifts of 8 hours each. The first shift started at 6 a. m. and the second at 2.30 p. m., ending at 11 p. m.. These hours were adopted to avoid undue disturbance during the night.

Before blasting the first lift of rock, channel cuts 5 or 6 ft. deep were made along the side of the shaft, to avoid damage to the walls of neighboring buildings. Timbering was required for a depth of only 10 ft. below the surface of the ground.

A drift, 30.6 ft. long, 17 ft. wide, and 27 ft. high, connected the south end of the shaft with the tunnels. The drift was excavated in three stages, a top heading and a bench in two lifts. While blasting the cut in the top heading there was enough concussion to break glass in the neighboring buildings. The use of a radialax machine reduced the concussion somewhat, but it was very quickly abandoned on account of the length of time required for the drilling.

The construction of the Thirty-second street shaft was quite similar to the one on Thirty-third street. It was 31.5 ft. long, 20.5 ft. wide, and 71 ft. deep. The depth of earth excavation averaged 19.5 feet. The rock in this shaft was seamy and not quite as hard or dry as that in Thirty-third street, and timbering was required for practically the full depth to the crown of the drift. Sinking was started on May 15, 1905, and was completed on October 26, 1905. The daily average rate was 0.30 ft. in earth and 0.52 ft. in rock. The drift was excavated in much the same manner as the one in Thirty-third street, but, the rock being softer, the radialax machine was not used.

(To be continued.)

THE BONUS SYSTEM ON THE SANTA FE.

In the *Railroad Age Gazette* of November 30 and December 7, 1906, will be found an interesting account of the betterment work on the Santa Fe, which describes the methods used in introducing the bonus system of paying for shop labor on that line, and especially at the Topeka shops. An account of the subsequent development of the system and the adoption of a standard set of schedules has been furnished by H. W. Jacobs, who has had general supervision of the whole work ever since its first introduction on the Santa Fe. The standard schedules, as now printed, are very elaborate and complete, and are illustrated by isometric sketches on which are the correct number and name of each piece. An idea of the minute detail which these schedules cover is shown by the fact that the book for a locomotive firebox covers 70 pages of printed description.

Mr. Jacobs' account of the bonus system is given below:

Day work, or the flat hourly rate, as a method of rewarding labor, is unsatisfactory both to the employer, who gets a minimum of work for the wages paid, and to the workman, who is prevented by the standard scale from earning in proportion to his ability. Many railways, realizing the inefficacy of day work, have attempted to place the wage proposition on a sounder basis by substituting payment by the piece or job for payment by the day or hour. In some cases this attempt has met with considerable success; in other cases, owing to unfortunate circumstances in connection with its introduction, full benefits have not been secured, or failure has resulted.

A method of paying employees not by the day or by the piece, but for their efficiency over a long period of time, is an advanced system of rewarding labor. This system is based on the accurate determination of standard time for the performance of any and all work, a feature which is probably the most important, yet the most neglected, part of shop management.

Efficiency is the relation between the actual record of a man, or the time he takes for a series of operations, and the standard or schedule set for him. If he attains the schedule on the average his efficiency is 100 per cent.; if he does better than schedule, the efficiency is over 100 per cent.; if he does not reach the schedule the efficiency is less than 100 per cent.

To secure the co-operation of the worker extra effort is rewarded by the payment of a bonus in addition to the regular wages. This bonus is determined upon by the efficiency attained and for each per cent. efficiency above a fixed figure, a certain percentage of the regular wages is paid as bonus. The payment of bonus is begun with an efficiency of 66 2-3 per cent. At 100 per cent. efficiency the bonus is 20 per cent. of the regular wages, an additional 1 per cent. of bonus being paid for each 1 per cent. efficiency above 100.

The care and thoroughness with which this system has been worked out on the Santa Fe, especially in the latest phase of the uniform standardization of all shop schedules and operations, for all conditions and classes of work, and the avoidance of measures tending to arouse the distrust of the men whose co-operation the new efficiency wage system was designed to secure, have all contributed to a harmonious relation between worker and costs heretofore unprecedented in railway practice.

The leading characteristic in which the efficiency system differs from piece work is in the establishment of a standard time for the performance of each operation, instead of a standard price. This distinction is particularly important, as it enables the times for a series of operations to be aggregated, permitting bonus to be paid, not for the production of any one operation in record time, but for a steady, efficient work output for all the various operations encountered in locomotive, car and other railway shop repair and manufacturing work. This plan, owing to the performance of the men being expressed in terms of an efficiency or per cent. of scheduled standard hours, permits the efficiency of a gang, group or department of men to be determined, and the wages of foremen paid on a bisis of the efficiency of the work performed under them. At the same time, the system does not seek to disturb the hourly or daily rate of pay.

The schedule of shop operations is the first requirement for the determination of a workman's output. As an outline of the work included in each repair operation, the schedule is essentially the backbone of any wage system that rewards the workman for extra effort.

With the introduction of the efficiency system on the Santa Fe in 1904, it was necessary to prepare a set of schedules for each shop. At that time it developed upon the men charged with that duty to prepare and introduce into shop practice schedules of all operations. Owing to the importance of covering the principal work with schedules in as short a time as possible, each shop organization arranged the schedules for local use.

With all the shops making and applying schedules independently, a large percentage of the work was covered with schedules in a very short time, but, as would be expected, the schedules developed at the different shops varied widely in make-up, wording and meaning. The personality, ideas and environment of those who created the early schedules naturally found expression in the arrangement of the schedules and the methods of applying them to shop conditions. Thus, as time went on the shops of the system continued to grow further apart in regard to schedules and methods.

The final outcome and results of this policy were foreseen some two years ago, or soon after the principal undertaking of applying schedules had been accomplished. In reports made at the time it was shown that, owing to the difference in construction of the schedules in the various shops, no comparison in the cost of repairs would be possible. Without this information intelligent supervision could not be carried on nor a consistent effort made toward reduction of repair costs to a uniform and economical figure. The tendency was

not toward uniform practice and repair costs, but away from it.

To improve these conditions it was proposed to arrange a standard set of schedules for general use in all shops of the system. Thus each shop would be working in direct competition with other shops, and the costs of repair operations would naturally approach a uniform standard. This progressive movement toward standardization was the logical step in the development of the bonus system, but it has naturally taken time to prove, to those interested in the efficiency of shop operations, the importance of this work of standardizing methods and schedules, and to secure the necessary assistance to begin so extensive an undertaking.

In time there grew a realization of the necessity for the standardization of schedules, and early in the year 1907 active work was begun. As nothing of the kind had ever been attempted the matter assumed pioneer proportions, and was therefore planned along broad and comprehensive lines.

The plan outlined included a number of important features, as follows: First, a complete numbering system that would last for all time without changes; second, a practical arrangement of schedules in logical sequence; third, a complete description of the work included by each schedule upon which only one interpretation could be placed; fourth, a complete set of sketches showing the construction of all parts for the instruction of timekeepers, foremen and workmen; fifth, a substantial make-up and satisfactory method of reproducing the schedules; sixth, a central organization having charge of all schedules.

In the actual work of standardization all the elements mentioned have been incorporated in the schedules. The results obtained show that the highest expectations have been realized, and in regard to the standardization of schedules the Santa Fe has made a beginning far in advance of any other railway.

This undertaking did not have its beginning yesterday, nor even a few years ago, when the plan was first introduced on the Santa Fe. It had its roots in a movement begun eight or nine years ago on the Burlington, when that road adopted a piece work method of rewarding labor, so as to cope with the labor situation successfully. While the officers in charge of that road pursued a consistent policy in rendering the piece work plan effective, the benefit would have been still greater had more suitable means of development been afforded.

Like all movements of this kind, the management was naturally anxious to have the new wage system in general effect in as short a time as possible. Consequently, the piece work schedules set to fit local conditions at the different shops did not agree as to method, description or cost allowed. It was foreseen by those engaged in the immediate carrying out of the undertaking that sooner or later it would be necessary to remedy this inconsistent and non-uniform state of affairs by the full standardization of the piece work schedules, methods and prices. Because of some doubt as to the value of a proposition of this kind, railway officers are cautious as to the amount of clerical expenses desirable to incur in the proper execution of a work of such large scope. This case proved to be no exception, and in many instances the schedule makers gave of their own time evenings and Sundays in order themselves to rearrange the schedules according to a satisfactory and uniform basis. One of the men engaged in this work went so far as to have the results of the standardization of schedules copied and typewritten at home by his wife, so that a concrete schedule in some completeness could be presented to his superior officers for their information respecting the nature of the task and in order to induce them by this example to give more assistance for carrying the standardization to full completion.

Especially must such pioneers be commended for their pertinacity and farsightedness in sticking to a new movement of this character through all the opposition, objection and difficulties strewn in the path of any innovation. It has been well said that man is by nature opposed to new things, and it is especially necessary that a reformer of practices that are deeply rooted should believe firmly in the principles he is serving. The pioneers' associated with this early development have lived to see the work in which they had faith a demonstrated and practical success on a large scale. On account of the discredit that frequently attached to their association with pioneering of this kind, these men must be particularly gratified at the success which has been built upon the foundation of their early efforts.

Later, when the success of the piece work plan on the Burlington had been demonstrated as a means of making labor more efficient, the Union Pacific decided to adopt a guaranteed piece work plan, and this road received great assistance in the quick introduction of the system from the co-operation, experience and knowledge extended by several of these men who were attracted from the Burlington. The prices and methods that had been reduced to written description were now further elaborated upon and perfected, and for the first time in the history of railroading, the influnce of high speed steel, the modern machine tool methods were taken into account and used to full effectiveness in establishing the methods and rates.

B. W. Benedict, formerly supervisor of schedules, had direct charge and supervision over the preparation of the standard schedules which are now embodied in a practical working form. Upon the appointment of Mr. Benedict as bonus supervisor of the Eastern Lines, the standardization of schedules was placed under the supervision of M. H. Haig, motive power assistant, formerly of the Illinois Central Railroad and later managing editor of the "Railway Master Mechanic." Of those mentioned as closely associated with the betterment work on the Santa Fe, R. Emerson now occupies the position of assistant to the general manager of the Lehigh Valley, and C. J. Morrison is engaged as a counseling engineer with the Harrington Emerson Co., an eminent organization of efficiency engineers.

Among the larger roads on which the application of piece work has produced the desired results may be mentioned the Burlington (the pioneer), the Lackawanna, the Union Pacific, the Lehigh Valley and the New York Central. On the first and on the last of these roads the moving spirit has been Richard T. Shea, and among those he trained on the former road were J. E. Epler, A. W. Whiteford, J. F. Whiteford and the writer. Mr. Epler applied his knowledge to the working out of both the Lackawanna and New York Central piece work plans, and Messrs. Whiteford and the writer filled similar offices for the Union Pacific. A. W. Whiteford is now with the Lehigh Valley; the other three have been connected with the Santa Fe for the past three to five years.

FOREIGN RAILWAY NOTES.

A concession has been granted to the Companhia Estrada de Ferro de Goyaz for building lines from Formiga, Brazil, to Goyaz, with a branch to Uberaba.

Surveys on the last section of the St. Petersburg to Kieff railway have been completed, but it is not known how soon construction will be begun. This last section extends from Llobine, Russia, to Kieff.

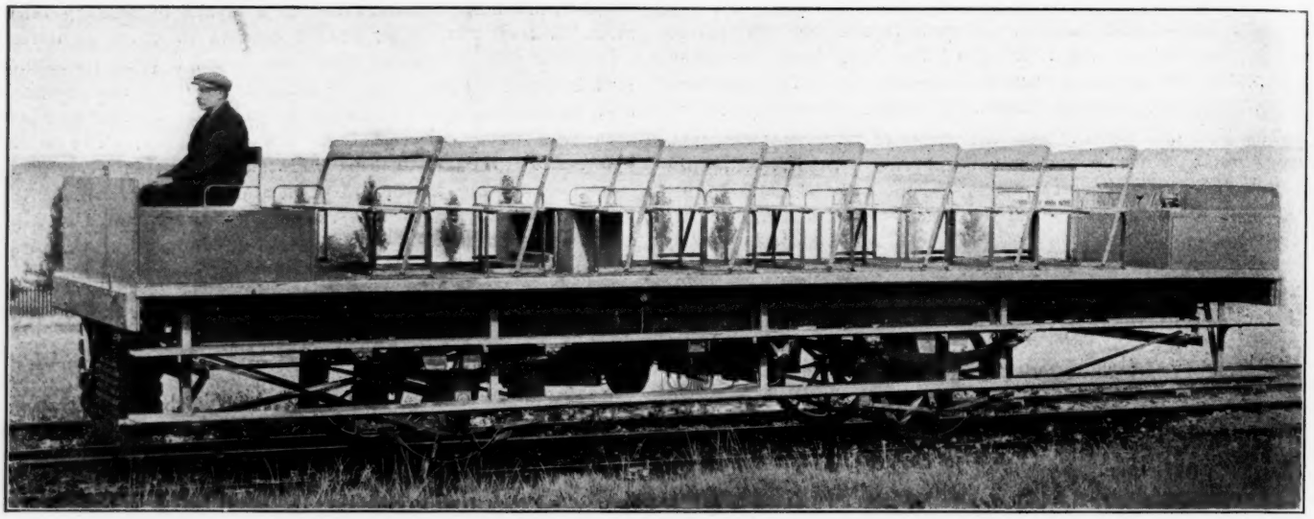
Experiments have been made on the Prussian State Railroads with ball-bearings for car axle journals. They are said to have shown a decrease of about 10 per cent. in the resistance at a speed of 25 miles an hour, and a much greater decrease in the power required to start. These bearings after 250,000 miles run were still in good condition.

RAILWAY MOTOR CAR FOR SIAM.

BY C. VAN LANGENDONCK.

The illustration herewith shows a railway motor car built for the Paknam Railway Co., of Siam. The car is of a type which should be of interest to railway people, as it embodies many features which render it as suitable for passenger as for light goods traffic.

As is seen from the illustration, the passenger accommodation is of the simplest character, since the car is to be used almost exclusively for carrying natives of the poorer class. The design permits of a more comfortable arrangement, that



Motor Car, Paknam Railway Co., Siam.

of a permanent awning, side curtains and cushioned seats. The car is built for a 5 ft. 6 in. gage. It has a capacity for 40 passengers, and is capable of ascending 2.5 per cent. grades and of rounding curves of 165 feet radii.

The fuel may be either petroleum or petrol spirit, the efficiency of the engine being practically the same on either. Fuel sufficient for a continuous run of about 300 miles is carried in the tanks.

The four-cylinder engine is of the standard Thornycroft type, developing 30 h.p. The crank shaft, cam shaft and gear wheels run in oil-tight castings, and the valves are operated mechanically. The cooling of the engine is effected by means of a radiator of the tank type, with vertically gilled tubes. The clutch is of metal to metal type, and the transmission gear is arranged to give two speeds in either direction, one up to about 18 miles per hour, and the other to about 40 miles per hour. The speed and reversing gears are controlled by single levers, one at each end of the car. The drive is obtained by means of a chain to one of the axles, and this gearing is enclosed in an oil-tight casting. The brakes are so arranged that the driver has control of the foot brake operating on the countershaft and a hand brake on one of the leading wheels, while the conductor has control of an independent hand brake acting only on the trailing wheels of the car.

On the trial trips the car carried a load equal to 40 passengers up a 2.5 per cent. grade, having a curve of 594 ft. radii at the rate of 15 miles per hour.

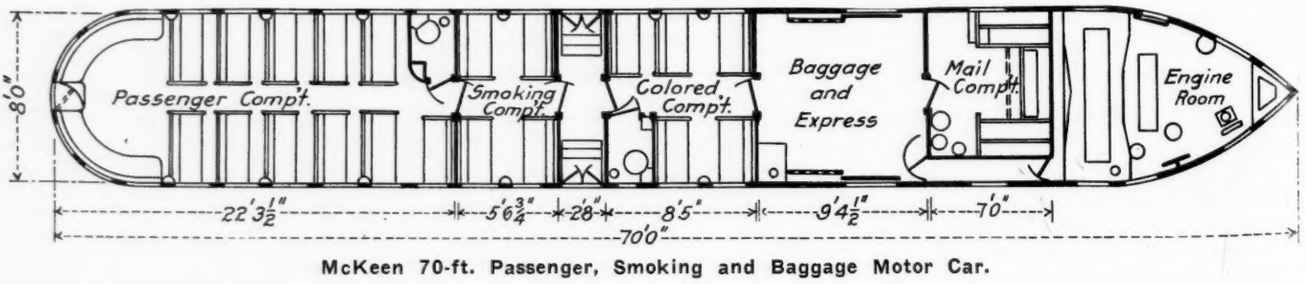
McKEEN MOTOR CAR FOR NORFOLK & SOUTHERN.

The McKeen Motor Car Company, Omaha, Neb., is building for the Norfolk & Southern a motor car which will have several novel features. The car proper is similar to the other 70-ft. motor cars made by this company. (See *Railroad Age Gazette*, January 15, 1909, page 110.) It is equipped with the company's standard 200-h.p. engine and embodies other standard features of its car construction, including the ventilating and heating system, round windows, center entrance, etc.

The car differs from others, however, in being designed to handle mail, baggage and express and also both white and colored passengers. As the accompanying floor plan shows, it will do the service of an entire train. It contains a 7-ft. railway postoffice, a baggage and express room, a compartment for colored passengers seating 10 persons, and a compartment for white passengers seating 50 persons. The compartment for white persons will be divided into a smoking compartment, seating eight, and a regular passenger compartment seating 42. The seats will be rattan. While the car will weigh only 68,000 lbs. it will do the service of a train which would weigh approximately 500,000 lbs.

The following are some details:

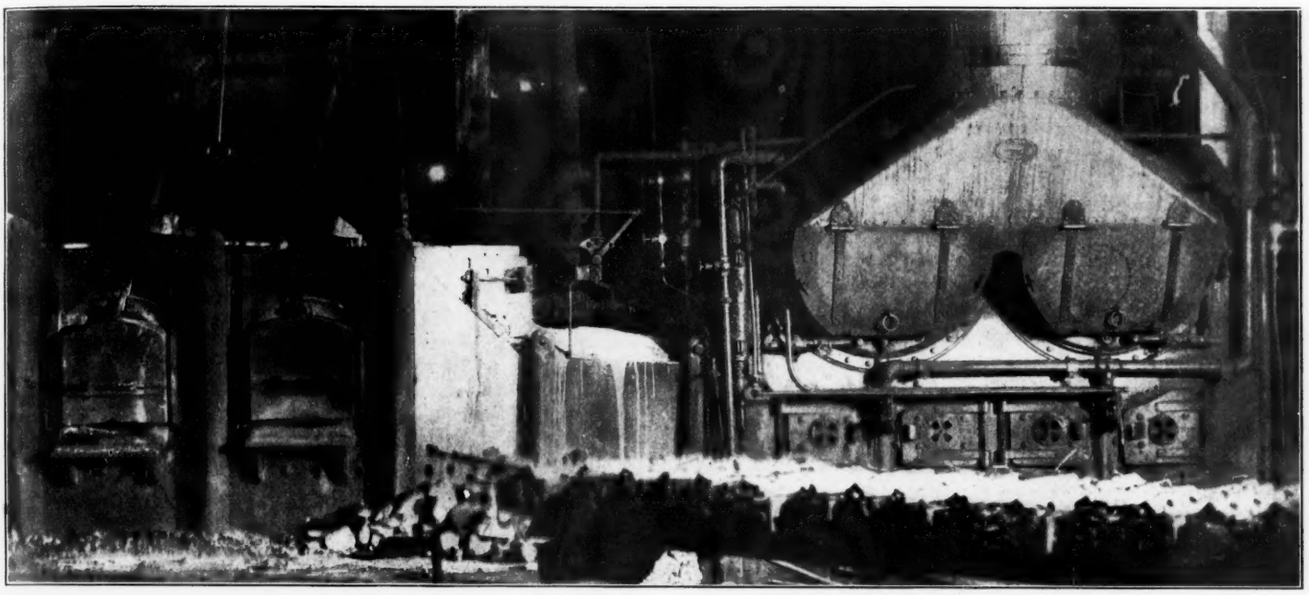
Weight of car in working order	68,000	lbs.	
Length between pulling faces of couplers	72 ft.	3¾	in.
" over end sills	70 "	0	"
" of engine compartment	13 "	8	"
" of mail compartment	7 "	0	"
" of baggage compartment	9 "	4½	"
" of smoking compartment	5 "	6¾	"
" of passenger compartment (white)	22 "	5½	"
" of passenger compartment (colored)	8 "	5	"
Width inside	9 "	4¾	"
Width over end sills	9 "	8	"
Width over all	10 "	2¾	"
Height, top of rail to top of car (light)	11 "	9⅜	"
Height, floor to ceiling at center of car	7 "	5⅝	"



McKeen 70-ft. Passenger, Smoking and Baggage Motor Car.

USE OF WASTE GASES IN SOUTHERN PACIFIC ROLLING MILLS.

In the *Railroad Age Gazette* of January 22, 1909, appeared an article regarding the rolling mills of the Southern Pacific at Sacramento, Cal. No mention was then made of the fact that the heated gases from the furnaces are conveyed to the adjacent boilers for steam generating purposes. The illustrations herewith show the furnace and boiler settings as installed in these mills and the method by which the heated gases from the furnaces are conveyed to the boilers.

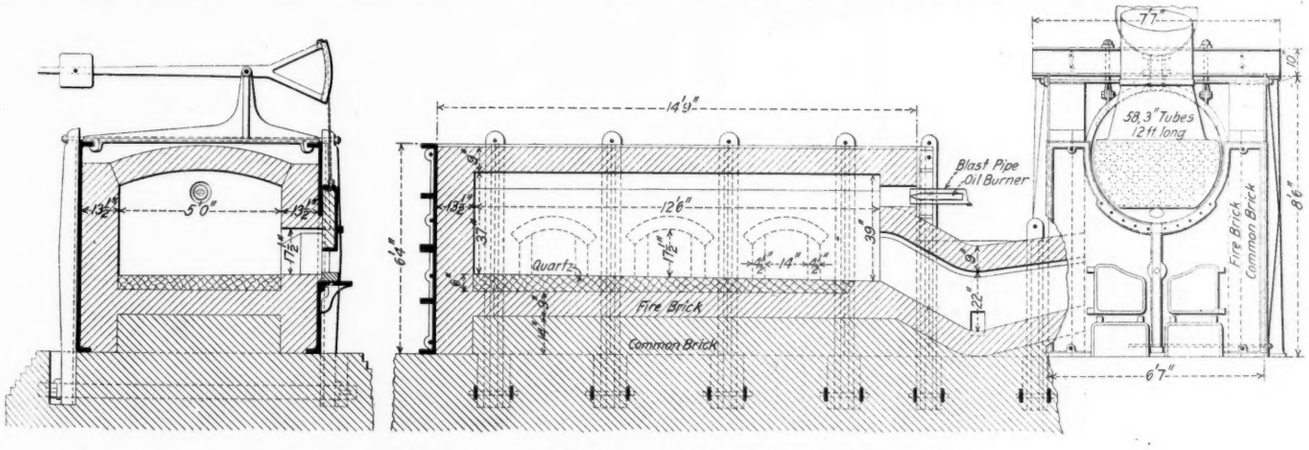


Oil Burning, 3-Door Reverberatory Furnace and Double Boiler.

The hot gases, after passing a second time over the iron in the furnace, go down through the connecting flue underneath the boilers to the up-take, and thence through the boiler tubes to the stack. A low-pressure burner is employed for atomizing the oil, using 8 oz. compressed air from the fan or blower. The only other draft used is the natural draft of the 50-ft. stack. The steam generated in these boilers in the rolling mill and hammer shop is used in the engines in operating the rolls, steam hammers, engine operating punches and shears and other tools not having independent motors.

The furnace shown in the accompanying half-tone is known as a right-hand, three-door oil-burning reverberatory heating furnace with double boiler. The floor of this furnace is built up about 23 in. from the ground line and faced with fire brick. A layer of quartz rock, high in silicon, of about 6 in. depth at one end and about 4 in. at the other, is then placed on top of this fire brick, giving the floor of the furnace a slope of 2 in. in 12, which allows the slag to flow readily to the slag hole. Reference to the line drawing shows this arrangement very clearly.

The furnace with double boiler arrangement was first put into operation on April 16, 1901. H. J. Small, General Superintendent of Motive Power, to whom we are indebted for the information and illustrations here given, writes that the double boiler system was installed after a great deal of criticism by experts to the effect that such a system would not be a success, but that the installation has proven successful from the start and has continually given good service.



Sections and Elevation of Furnace and Boiler.

FOOTBALL TRAFFIC ON THE NEW HAVEN ROAD.

The tables for football traffic on the New York, New Haven & Hartford on November 13, 1909, the day when the Yale-Princeton game was played, repeat the precisions of service and operation safeties of previous years. The Yale-Princeton game, it is to be recalled, crowds practically all the traffic on a single—the New York—division, while in the biennial Yale-Harvard game at New Haven traffic distributes itself east and west from New Haven on two divisions. On the other hand, the traffic between New York and New Haven gets the advantage of four tracks, while at the Yale-Harvard New Haven game for the New Haven's "long haul" upon the Shore Line route there are but two tracks only partly relieved by

the New Haven "short haul" route to Boston via Springfield.

The average passenger receipts per day on the New Haven system of 4,114 single track miles and 2,044 distance miles was in the last fiscal year $62,608 per day, Sundays included. The football receipts on the day of the game were $45,058 or somewhat less than two-thirds the receipts per day on the system. But the ratio would be varied considerably could football travel on the day before and the day following be reckoned in. Owing chiefly to the long haul from Boston, the biennial Yale-Harvard game at New Haven brings in much larger receipts than the Princeton match. Last year, for example, the receipts were $71,299 or about $8,400 more than a normal day's passenger receipts on the system.

This year the automobile attendance at the game showed a great increase, some of the higher estimates of automobiles packed near the field or in New Haven garages rising into low thousands. This automobile competition is indicated by the decrease of the number of passengers from 33,599 in 1907 to 32,295 in 1909. But the increase of receipts from $40,968 to $41,281 shows an increase of the long distance traffic more specifically measured in part by the increase from 13,418 to 17,844 of passengers from New York. On occasions of this kind the automobile is evidently a short distance rather than a long distance competitor, as indicated by the decided falling off of passengers from Hartford, Bridgeport and other Connecticut cities.

The returns of the service show how closely the many specials made the running time of about two hours between New York and New Haven, a distance of 73 miles; and of the army of passengers handled not one was injured.

To the magnitudes of the steam traffic must be added the receipts of the New Haven Company's trolleys in and about New Haven, which, it is estimated, must have carried about 150,000 passengers. But the trolley receipts, allowing for transfers, probably several thousand dollars, show small net profits, owing chiefly to the brief periods of transit to and from Yale field, and the pay to idle conductors and motormen.

The official returns are annexed:

YALE-PRINCETON FOOTBALL GAME SERVICE NOVEMBER 13TH, 1909.

Trains from New York to New Haven.

Train.	Left New York.	Arrived New Haven.	Cars in train.	Passengers.
272	5:46 a.m.	8:30 a.m.	4	183
276	7:46 "	10:00 "	8	228
46	8:01 "	9:46 "	12	271
A	8:03 "	10:03 "	12	683
B	9:00 "	10:56 "	12	904
50	9:16 "	11:11 "	12	690
C	9:09 "	11:08 "	12	718
D	9:25 "	11:17 "	10	260
F	9:30 "	11:25 "	10	289
G	9:26 "	11:18 "	12	893
H	9:50 "	11:43 "	12	770
10	10:00 "	11:39 "	7	139
12	10:03 "	12:00 m.	12	768
I	9:58 "	11:54 a.m.	12	888
278	10:06 "	12:51 p.m.	6	275
J	10:10 "	12:06 "	10	290
K	10:15 "	12:12 "	10	345
M	10:13 "	12:20 "	12	857
N	10:27 "	12:27 "	12	822
O	10:45 "	12:42 "	10	299
P	10:50 "	12:50 "	10	496
Q	10:54 "	12:57 "	12	952
P. R.R.	10:55 "	12:30 "	3	100
52	11:01 "	12:55 "	12	155
Ex. Special	11:26 "	1:04 "	2	4
Bot. Special	11:30 "	11:58 a.m.	12	525
Wby Special	10:30 "	11:50 "	8	321
1st 54	12:01 p.m.	1:42 p.m.	5	152
2d 54	12:05 "	1:47 "	10	171
65	.....	9:30 a.m.	11	500
809	.....	11:38 "	9	388
1107	.....	11:57 "	7	346
5	.....	11:50 "	5	241
U	10:16 a.m.	11:15 "	12	540
V	11:02 "	12:02 p.m.	12	839
45	.....	12:26 "	11	330
61	.....	12:50 "	10	109
1031	.....	1:19 "	3	83
9	.....	1:15 "	7	54
49	.....	1:25 "	12	194
659	.....	9:28 a.m.	5	240
1403	.....	7:40 "	3	30
1407	.....	9:05 "	2	102
1411	.....	12:24 p.m.	4	172
1409	.....	11:12 a.m.	6	318
661	.....	1:50 p.m.	4	55
811	.....	1:52 "	5	107
				18,105

Trains from New Haven to New York.

Train.	Left New Haven.	Arrived New York.	Cars in train.	Passengers.
A	4:29 p.m.	6:20 p.m.	12	650
B	4:43 "	6:41 "	12	824
287	4:35 "	7:50 "	8	89
C	4:51 "	6:54 "	12	693
G	5:03 "	6:51 "	12	985
H	5:15 "	7:05 "	12	770
17	5:19 "	7:28 "	12	660
289	5:41 "	9:48 "	8	600
I	5:44 "	7:40 "	12	1,357
N	6:01 "	8:18 "	12	1,066
D	6:05 "	8:11 "	10	276
F	6:11 "	8:23 "	10	274
J	6:16 "	8:26 "	10	278
55	6:18 "	8:32 "	12	856
K	6:23 "	8:30 "	10	292
O	6:28 "	8:44 "	10	305
P	6:38 "	9:00 "	10	465
P. R.R. Special	6:39 "	8:30 "	3	98
21	6:53 "	8:55 "	11	586
57	7:14 "	9:27 "	12	394
1/59	7:50 "	9:35 "	14	491
2/59	8:00 "	9:44 "	8	79
23	8:18 "	10:00 "	5	110
1/25	9:23 "	11:15 "	8	162
2/25	9:30 "	11:21 "	9	415
293	9:25 "	12:24 "	7	100
1/71	12:00 m.	1:57 a.m.	9	504
2/71	12:12 a.m.	2:07 "	12	51
Waterbury Spec'l	5:31 "	6:45 "	8	259
1426	5:45 "	7:12 "	4	110
1430	7:54 "	9:04 "	4	85
22	5:00 p.m.	8:59 "	11	150
822	5:00 "	7:05 "	4	358
666	5:15 "	7:52 "	5	288
Special U	5:25 "	6:30 "	12	465
Special V	6:02 "	8:03 Spgfld.	12	508
60	5:56 "	7:40 "	11	215
1028	6:03 "	8:35 Wilmntc.	5	172
1112	6:05 "	8:28 "	6	350
668	6:16 "	7:42 "	6	130
286	6:19 "	7:28 "	6	160
24	6:50 "	10:10 "	7	88
290	7:09 "	8:20 "	8	200
26	7:26 "	11:18 "	10	336
64	8:13 "	9:58 "	9	332
66	10:13 "	12:14 a.m.	11	329
70	1:21 a.m.	3:33 "	10	55
				18,110

Special train I, outgoing from New Haven, with 12 cars carrying 1,357 passengers or 113 passengers per car, is a noteworthy instance of train elastics.

The summaries with comparisons with the Yale-Princeton game of 1907 are as follows—the returns for number of passengers counting one passenger for a round trip:

Statement Showing the Approximate Amount of Revenue Accruing Account of the Yale-Princeton Football Games at New Haven, Nov. 13, 1909, *and Nov.* 16, 1907.

Special ticket business.	1909 No. passengers.	1909 Revenue.	1907 No. passengers.	1907 Revenue.	Increase No. passengers.	Increase Revenue.
New York	17,844	$26,766.00	13,418	$20,127.00	4,426	$6.639.00
Bridgeport	1,400	490.00	1,800	630.00*	400*	140.00
Hartford	804	603.00	1,262	946.50*	458*	343.50
Meriden	656	262.40	1,190	476.00*	534*	213.60
Stamford	276	220.80	360	288.00*	84*	67.20
South Norwalk	270	175.50	230	149.50	40	26.00
Springfield	212	265.00	186	232.50	26	32.50
Other points	446	329.80	961	930.15*	515*	600.35
Total	21,908	$29,112.50	19,407	$23,779.65	2,501	$5,332.85
Ex. of reg. busins.	10,387	12,169.09	14,192	17,188.68*	3,805*	5,019.59
Total	32,295	$41,281.59	33,599	$40,968.33*	1,304	$313.26
Parlor and sleeping cars:						
New York	.....	$2,384.00	.....	$2,031.50	.....	$352.50
Ex. of reg. busins.	.....	1,392.95	.....	1,539.00	.....	‡146.05
Total	.....	$3,776.95	.....	$3,570.50	.....	$206.45
Grand total	32,295	$45,058.54	33,599	$44,538.83*	1,304	$519.71

*Decrease.

The returns of the company for the Yale-Harvard game, one week later (November 20), show that special trains and cars earned $6,731, to which adding 8,000 increase earned by regular trains and $2,000 by the Sound boats, the total increase becomes $16,731. The returns in number of round trip passengers for five years have been:

	Passengers.		
	1905.	1907.	1909.
Yale-Princeton game	14,524	17,607	18,105
	1906	1908.	
Yale-Harvard game	21,528	21,215	

A special pamphlet was issued, giving instructions and schedules for the electric service between New York and Stamford, besides several pamphlets relating to the steam

service. Some of the more general instructions were as follows:

"Familiarize yourself with the instructions contained herein, that there may be no delay or misunderstanding in the handling of the service.

"Familiarize yourself with the time of all trains, both special and regular.

"Westmoreland coal will be furnished engines of all football specials. Switchers at New Haven to be given a full supply of coal and water just before the specials begin to arrive to avoid the possibility of delay on this account.

"Engine 396 will be on the New Haven wrecker headed west, engine 261 on the Harlem River wrecker headed east and engine 296 on the East Hartford wrecker headed south, for use at any time during the day.

"Conductors of all special trains will report by wire the number of passengers arriving at New Haven and leaving New Haven. Conductors of regular trains arriving at New Haven before 2 p. m. and departing from New Haven after 4.30 p. m. will report the number of passengers for and from New Haven.

"The working limits of work trains must be restricted as necessary to absolutely prevent interference with passenger trains during the movement of football service.

"Chief Despatchers must see that freight trains clear all specials and first-class trains at least twenty (20) minutes during the movement of football service.

"Drawbridges must not be opened within fifteen (15) minutes in advance of any special or first-class train during the movement of football service, except in case of extreme necessity, and Chief Despatchers shall see that towermen are instructed accordingly.

"Operators in block stations must use great care in plunging for the release of block, so that there will be no delays on account of signal failures, and must announce and clear up all trains clearly and promptly.

"Enginemen are cautioned to use care in approaching all congested terminals, particularly New Haven, Hartford and Stamford, and proceed only as the way is known to be clear."

NEW HAVEN TERMINAL.
Special Instructions.

Between towers No. 78 and No. 79, in both directions, trains must run carefully, prepared to stop at any point and proceed only as they know the way to be clear.

Conductors will, whenever possible, station themselves on the rear end to personally superintend the flagging.

Conductors of special trains must notify passengers to unload promptly, as trains will be moved to distant part of yard.

Closets must be locked from arrival to departure of trains.

Conductors must see that all articles left by passengers after leaving cars are delivered to Station Master's Office.

Engines when released from their trains will turn, spark, water, etc., promptly returning to their trains ready for the return movement.

Train crews must remain with their trains to assist and direct passengers, see that their cars are properly carded, and do everything in their power to facilitate the work in yards.

Conductors must see that all cars are properly coupled, and that their trainmen have cars well lighted before 3:30 p. m.

Conductors and trainmen will call frequently the destination of their trains, announcing the stops.

At completion of inspection, the inspectors will notify the rear brakeman, who will signal his conductor from the rear platform of rear car.

SUBWAYS IN NEW YORK AND IN PARIS.

The *Electric Railway Journal* prints the following interesting comparisons of subway operations in New York and in Paris:

TABLE I.—*Traffic Density.*

	For year ending June 30, 1908, New York subway.	For year ending Dec. 31, 1908, Paris subway.
Passenger cars	837	951
Average seats per car	52	28
Total number of seats	43,524	27,579
Average passenger places per car	103	64
Total number of passenger places	82,211	60,751
Passenger car-miles	44,005,213	34,629,014
Per mile of line (average operated)	1,910,777	1,147,986
Per mile of single track (av. oprat'd)	716,697	573,993
Per fare passenger	.2195	.1226
Seat miles	2,288,271,000	950,612,000
Per mile of line (av. operated)	99,360,000	31,812,000
Per mile of single track (av. oper.)	37,268,000	15,906,000
Per fare passenger	11.41	3.397
Passenger place miles	4,532,536,000	2,216,256,000
Per mile of line (aver. operated)	196,810,000	73,471,000
Per mile of single track (av. oper.)	73,819,000	36,735,000
Per fare passenger	22.61	7.84
Fare passengers	200,439,776	282,427,235
Per mile of line (av. operated)	8,703,420	9,362,752
Per mile of single track av. oper.)	3,264,491	4,681,376
Per car-mile	4.555	8.15
Per seat-mile	0.0875	0.293
Per passenger-place-mile	0.044	0.127

TABLE II.—*Revenue from Transportation.*

	For year ending June 30, 1908, New York subway.	For year ending Dec. 31, 1908, Paris subway.
Earnings from transportation	$10,020,538	$7,708,390
Per mile of line (av. operated)	435,108	255,583
Per mile of single track (av. oper.)	163,200	127,770
Per passenger, cents	4.996	2.729
Per car-mile, cents	22.77	22.26
Per seat-mile, cents	0.437	0.767
Per passenger-place-mile, cents	0.221	0.347

TABLE III.—*Gross Revenue from Operation and Its Apportionment.*

	Amount.	Per ct. of gross revenue from operation, per cent.	Per mile of single track operated.	Per passenger car-mile, cents.	Per passenger place-mile, cents.	Per fare passenger, cents.
Gross revenue from operation: New York subway	$10,253,337	100	$166,992	23.3	0.226	5.11
Paris subway	7,847,954	100	130,083	22.66	.354	2.77
Operating expenses (taxes excepted): New York subway	4,423,313	43.14	72,040	10.05	.097	2.20
Paris subway	3,035,797	38.68	50,319	8.76	.136	1.07
Taxes: New York subway	59,540	.58	969	.13	.001	.02
Paris subway	262,141	3.34	4,345	.75	.011	.09
Rental to city for use of subway: New York subway	1,991,984	19.42	32,442	4.52	.043	.99
Paris subway	2,560,854	32.63	42,447	7.39	.116	.90
Net earnings, less taxes and rental: New York subway	3,778,498	36.85	61,539	8.58	.083	1.88
Paris subway	1,989,161	25.34	32,971	5.74	.089	.70

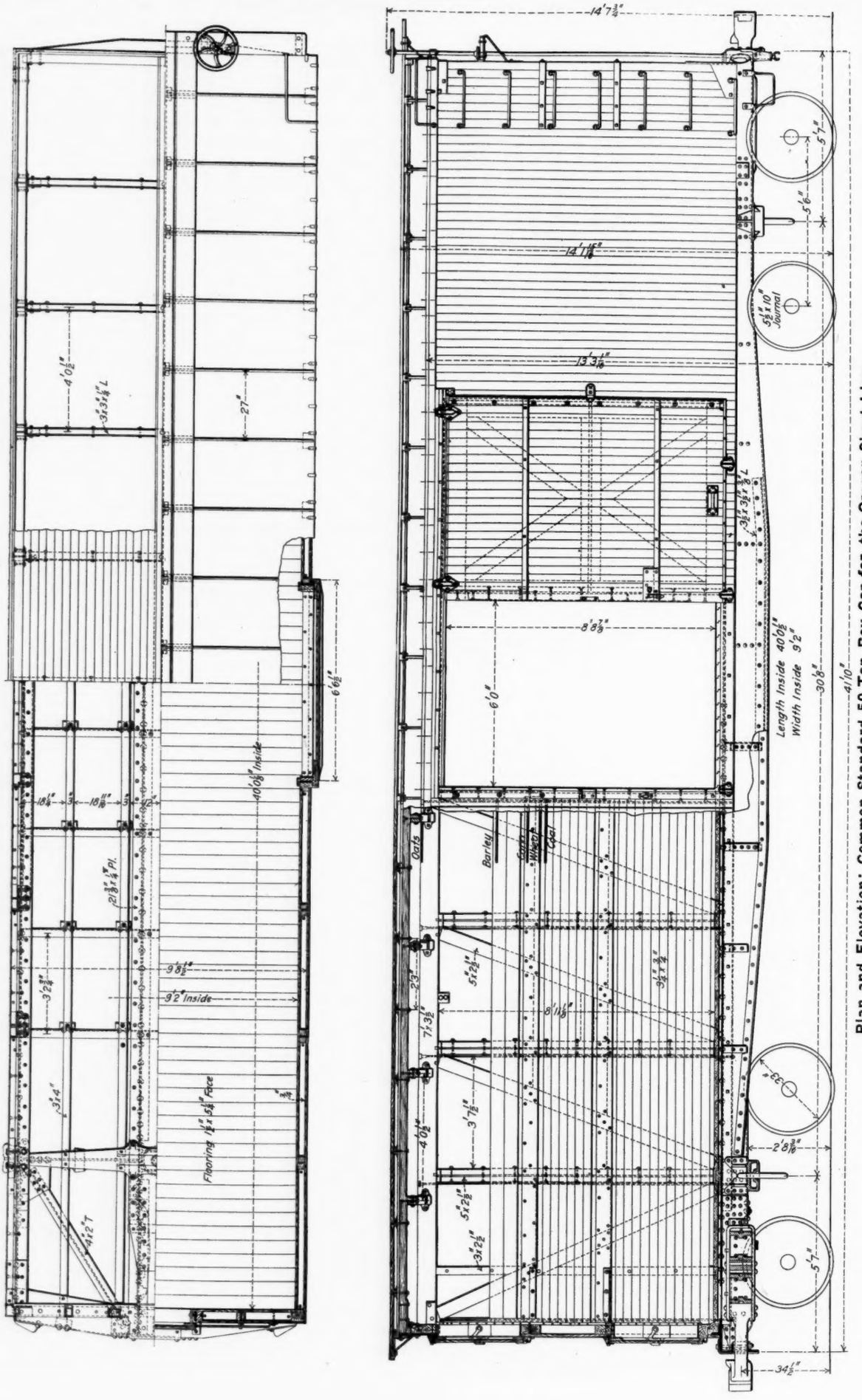
TABLE IV.—*Total Cost of Subway and Apportionment between City and Company, and between Construction and Equipment,* 1908.

	New York subway			Paris subway		
	Amount.	Per mile of single track.	Per cent. total cost.	Amount.	Per mile of single track.	Per cent. total cost.
Total cost of subway and equipment	$87,938,000	$1,432,000	100.0	$62,252,000	$1,000,000	100.0
Cost of construction paid by city	51,290,000	835,000	58.3	36,700,000	590,000	59.0
Cost of equipment and construction paid by company	36,648,000	596,000	41.7	25,552,000	410,000	41.0
Total cost of construction	61,338,000	999,000	69.8	42,100,000	676,000	67.6
Total cost of equipment	26,600,000	433,000	30.2	20,152,000	324,000	32.4

FIFTY-TON BOX CAR WITH STEEL UNDERFRAME FOR OREGON SHORT LINE.

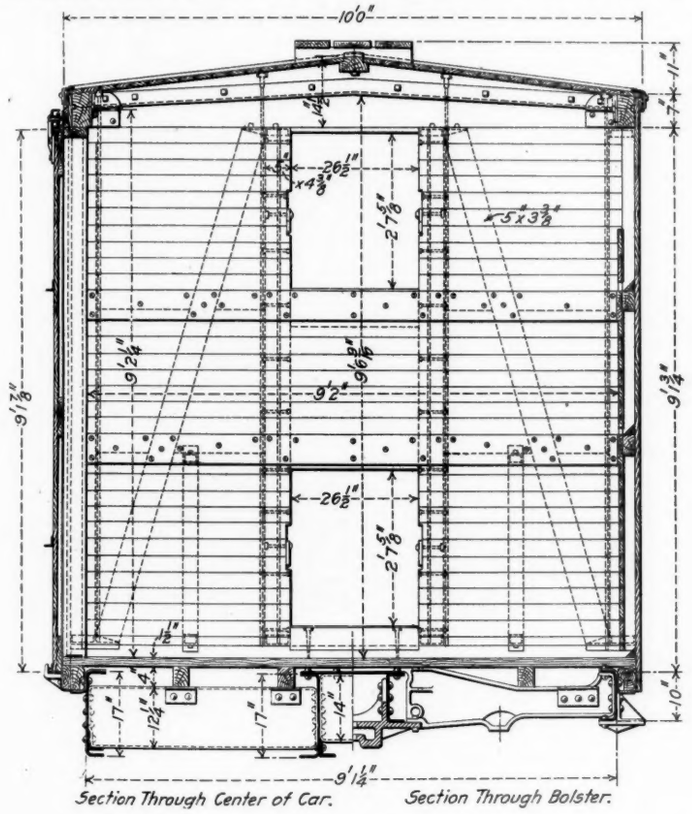
The Oregon Short Line has recently received 500 new box cars with steel underframes and an exceptionally large cubic capacity. The plans for the cars are those adopted as common standard by the Harriman lines in December, 1908. The width inside is 9 ft. 2 in., which is the maximum allowable by the clearance limits, as the extreme width over all is 10 ft. 6 in. The height also is greater than usual, being 9 ft. 2½ in. top of floor to bottom of carline. The length inside of lining is 40 ft. ⅛ in., and cubic capacity 3,370 cu. ft. The weight of each truck is 8,016 lbs. and of the car complete 43,163 lbs.

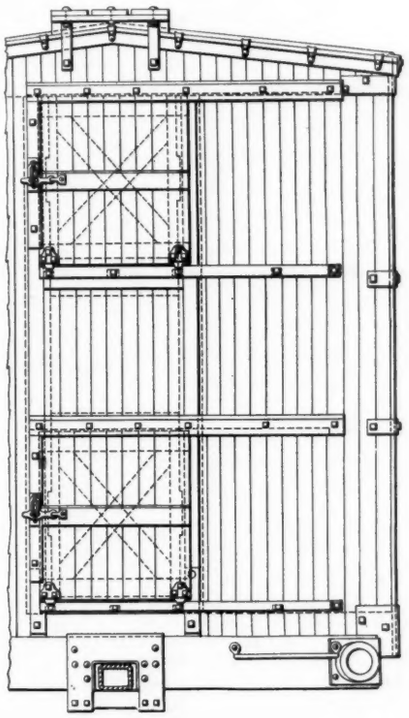
The main portion of the underframe is made up of four pressed steel longitudinal sills 17 in. deep at center and ⅜ in. thick, and the depth at bolster is 10 in. The body bolster is cast steel with side bearing cast integral. The pressed end sill is braced diagonally by 4 x 2 in. T irons connected to bolster and side sill by a wide gusset plate. Pressed steel cross bearers at the ends are 10 in. deep and at central portion 14 in. The wooden side stringers, which are 3 x 5 in., rest on Z bars riveted to side sills, and there are two intermediate wooden stringers 3 x 4 in. on each side. The center sills have a top cover plate ¼ in. thick. The wooden posts are sandwiched with ½-in. wrought iron plates secured with



Plan and Elevation; Common Standard 50-Ton Box Car for the Oregon Short Line.

½-in. carriage bolts. The roof is made of $\frac{13}{16}$-in. pine, laid longitudinally and covered with Murphy galvanized iron roofing sheets .022 in. thick. The 33-in. wheels weigh 715 lbs. and the journals are 5½ by 10 in. The construction of the car is unusually strong throughout, and it is a fine example of the best design in modern car building.





Cross Sections and End Elevation; Common Standard 50-Ton Box Car for the Oregon Short Line.

RAIL CREEPING ON WET SUB-GRADE.

Between Sand Hill, N. J., and Vernon, the Lehigh & Hudson River runs for about three miles over constantly wet meadows, which are evidently an old lake bed. The single track is about five feet above the level of the meadow, and the bank is floated on the original turf surface over a considerable depth of alluvial mud. In th original construction the turf on either side of the bank had been cut for borrow pits. Previous to 1904 the track was laid with 65-lb. rails with joints broken and pole and square ties 7 in. thick, spaced 16 to the 30-ft. rail; pole ties were not less than 7 in. face, and square ties 9 in., and 8 ft. 6 in. long, except on about 1,500 ft. of the weakest portion of track where ties were 10 ft. long. On this part of the line there were several derailments, and buckling and change of gage caused by creeping track were frequent. There is no grade or curvature, and the movement of rails and ties was toward the east, the direction of over 60 per cent. of the tonnage carried. The track crept as much as 13 ft. in one week, and, under a heavy east-bound train, individual rails would move as much as 2½ in. and an average of 1 in.; ties were bunched or skewed several feet out of original position. The explanation of the movement lies in the direction of the greater traffic and the floating character of the roadbed, which latter would sink beneath the locomotive and give the effect of running up grade and therefore pushing the rails. This tendency to push the track existed undoubtedly in both directions, but most in the direction of greatest traffic. The joints were probably not in the best condition and added to the effect of the undulatory movement of the track.

In 1904, 80-lb. rails were laid for the entire distance and were efficient in holding the track sufficiently to prevent derailments. Recently the traffic of the road has largely increased, due to the diversion of freight, principally coal destined for New England, from the Central of New Jersey and Delaware, Lackawanna & Western in order to make use of the Poughkeepsie bridge and avoid the congested terminals adjacent to New York. To meet this condition, the 80-lb. rails were replaced with 100-lb. rails, 33 ft. long. Rail joints are broken and suspended, and there are additional splice plates at the center of each rail opposite each joint. The track was broken with compensating switch points, as shown in one of the photographs, to permit movement without distortion to the track and to enable it to be watched. Ties conform to standard for thickness and face; more ties 10 ft. long are used, and the spacing is made 18 to the 33 ft. rail.

To try to get the greatest stiffness and life, rails were made of open hearth steel of high carbon content, as follows: Carbon, 0.65 to 0.80; phosphorus, 0.06; silicon, not over 0.20; manganese, 0.70 to 1.00. They were furnished by the Bethlehem Steel Co., under careful inspection. The joints are the Bonzano, 6-bolt, and slotted for 8 spikes. The intermediate joint plates are held in place with two bolts.

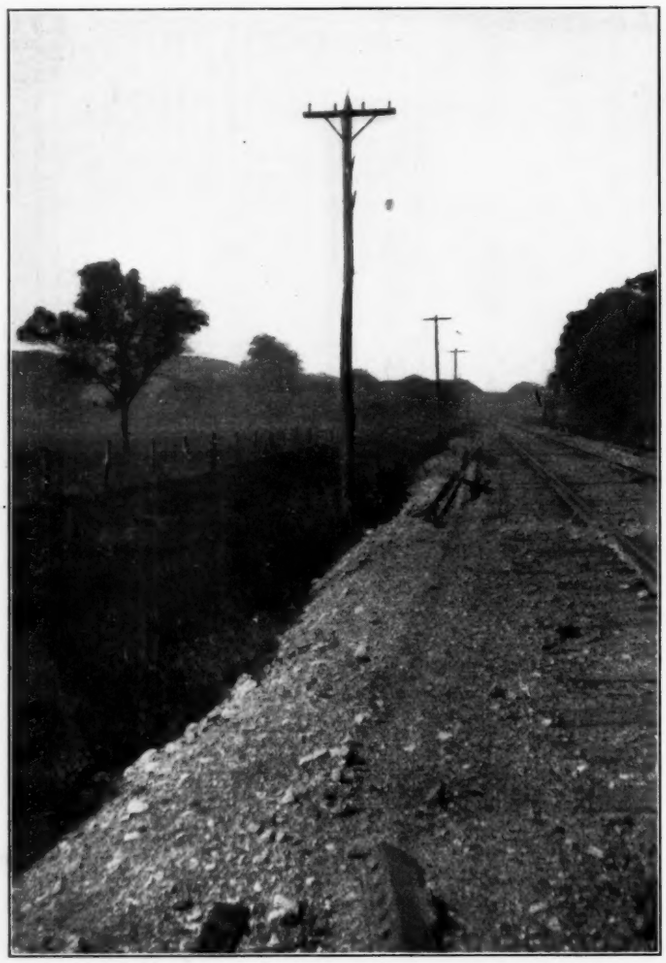
A slight but steady settlement of the entire bank has been taking place. Two years ago the bank was raised with good gravel 6 in. and this year 8 in., being made about 20 ft. wide at grade. Material is left on the shoulders for subsequent use when needed. Otherwise the track is not ballasted.

The new track has been in place since October 1 of this year, and up to December 1 there had been no perceptible wave in the rail in front of the locomotive, as was the case with the former 65-lb. rails, nor any creeping of the track indicated at the compensating switch points. Individual ties show a crowding of gravel on the east side and a slight movement away from the gravel at the rear, and occasional ties skew. The roadbed shows a marked tremor under the passage of trains, and slight longitudinal cracks appear at the ends of the ties, showing the floating character of the fill.

A curious effect of passing trains on a fill of this character

was shown before the new rails were laid. They were received and distributed along the old track about ninety days before the splice plates were delivered. During this time many rails moved westward along the bank—that is, against the heavier traffic. As shown in the illustration there was a well-marked trail, and several rails buried their ends in the gravel. The greatest movement of any rail was 70 ft. This movement was undoubtedly due to the slight undulatory movement of the track and entire fill, and probably some reaction of the fill itself against the track. It must certainly have been an extraordinary condition that made rails weighing 1,000 lbs. move along apparently of their own accord at the rate of nearly a foot a day.

The methods used by this road to prevent creeping track



Movement of Rails Laid Alongside of Track.

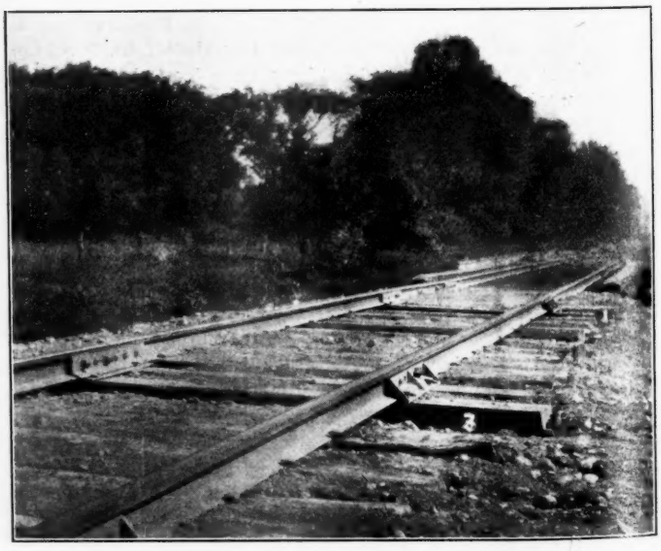
The right-hand rail lying by the near telegraph pole moved 40 ft. The trail it left may be traced from a point near the angle bar in the foreground.

are sufficient to prevent derailments. The compensating switch points are a certain means of safety and of determining any considerable movement; and the heavy rails and well supported joints largely reduce the tendency to creep. It is doubtful if the width of bank at grade, 20 ft., does more than add to the load already floating, or that the extra length of ties stiffens the rails, although it undoubtedly makes it more difficult for the track to creep. The flexure of ties is such that full support to the rails is secured only by efficient tamping for about one foot each side of the rail seat. The joints could be further stiffened by placing special joint ties under them, and moving the two adjacent ties closer. The adoption of broken joints by the railway was with the view to stiffening the track against buckling. Tie plates could be used with advantage and are to be placed shortly. Special attention is being given to tamping and to keeping the spikes bearing properly, and both are important. Any settlement of track will be made up with additional ballast, and each raise should slightly stiffen the floating track. There is no evidence of serious settling or of material flowing out beneath the fill and being forced up on the sides.

The heavy traffic is largely fast freight and two trains are scheduled at 18.4 miles an hour, including stops for four grade

Compensating Switch Point to Allow for Creeping Rails.

crossings, coal, water and orders; others run at 16.5 miles. The actual running time for all trains at the point of creeping track is frequently 30 miles an hour. There are 24 to 26 trains a day, of which four are passenger, four non-tonnage freight, and the others tonnage freight. The maximum load is 2,500 tons, and the maximum gross load per day east-bound is about 18,500 tons. Since August, 1908, there has been a rapid increase of traffic, as mentioned above, and the east-bound traffic passing over the creeping track is now 83 per cent. of the total. Immediately west are large lime kilns, at McAfee, and a large mine of the New Jersey Zinc Co., at Franklin, which ship mostly west-bound, so that at Franklin the traffic is 60 to 65 per cent. east-bound, and 40 to 35 per cent. west-bound. For the year ending June 30, 1908, the average monthly ton mileage was 9,332,115; in August, 1908, 8,445,778; in September, 14,884,778; in October, 21,930,716; for the twelve months since it has averaged 18,700,000 tons.



Movement of Tie Through Ballast at Special Joint.

THE PROTECTIVE TARIFF AND RAILWAY REGULATION.*

BY SAMUEL O. DUNN,
Western Editorial Manager of the *Railroad Age Gazette.*

Tariff revision and regulation of railways are perhaps, the two most important public questions now being considered in this country. Their simultaneous consideration calls attention to marked differences between the way the national government deals with manufacturers and railways. Manufactures and rail transportation are, except agriculture, the two greatest industries of the United States. The nation is committed equally to regulation of railways and to protection of manufactures; and the merits of neither policy, per se, will be entered into here. But a statement of the way these two policies affect and react upon the two great industries mentioned will, it is believed, present aspects of both policies that will be new to many readers.

The principal purpose of the protective tariff is to safeguard the manufacturer against foreign competition in the home market. It restricts or prevents the sale here of many foreign articles. Those who favor protection say that this is a good thing because it enables the domestic manufacturer to get large profits, pay high wages and make some things that he otherwise could not.

The railway's plant is analogous to the manufacturer's factory. It "makes" transportation. If it is expedient to protect our manufacturers by imposing import tariffs, why would it not be expedient to protect our railways by imposing tariffs (if this were constitutional) on goods that are shipped into or out of the country via foreign railways or steamship lines when they could be shipped via United States railways? Whether such a policy would be expedient or not, it never has been seriously proposed. The railways of the United States have constantly to meet the full force of the competition of the Canadian and Mexican railways and of the steamships of those and other countries. The Canadian Pacific competes with them for traffic from Pittsburg and other eastern points to the Pacific coast and the Orient. The Grand Trunk competes with them for traffic between Chicago and New York. The Tehuantepec Railway competes with them for traffic between New York and San Francisco. There is a constant struggle between American railways and the British steamships for freight, which may move from Pittsburgh and Cleveland to Asia and Australia either eastward by ocean or westward by rail to the Pacific coast, and thence by steamship.

The government not only does nothing to protect the railways against competition, but it is spending many millions of dollars building the Panama Canal, which will stimulate competition against them; and it is preparing to spend other millions in developing inland waterways further to stimulate competition against them. The development of waterways unquestionably is expedient and needful. But it will be recalled that when Kansas appropriated money to start a twine factory to compete with the manufacturers of binding twine, and when it later appropriated money to start oil refineries to compete with the Standard Oil Company, that state was warned that it was embarking on the uncertain seas of Socialism.

Protection enables the domestic manufacturer to charge higher prices for his products than he could get if he had to meet foreign competition. The large majority in this country who favor protection think the high prices it causes are advantageous not only to the manufacturer, but also to his employees and the public. The railway's charges for hauling freight and passengers are its prices. If high prices for shoes or steel rails are a good thing, why would not high prices for hauling shoes or steel rails be a good thing? The manufacturers of the United States in 1905 paid out 21 per cent. of their gross receipts in wages and salaries. The railways in the same year paid out 40 per cent. of their gross receipts in wages and salaries. If high prices for concerns that pay out 21 per cent. of their gross receipts are a good thing for wage-earners, why would not high rates for concerns that pay out 40 per cent. of their gross receipts in wages and salaries be a good thing for wage-earners?

While, however, the national government, by the protective tariff, helps the manufacturers to get high prices, it has adopted a policy of railway regulation that tends to make and keep railway rates low. The Hepburn amendment to the Interstate Commerce Law empowers the Interstate Commerce Commission when it finds a railway rate unreasonable, to substitute for it a "reasonable maximum rate." It does not give the commission power to fix a reasonable minimum rate. The assumption seemingly was that the commission would find rates that were too high, but would never find any that were too low. Consequently, when the commission finds the relation between two rates or schedules of rates unfairly discriminatory, it must correct the unfairness by lowering the higher rate or schedule.

It may be said that as the railways are left free to raise any rates that the commission has not fixed, it is not necessary for the commission to have power to raise rates. But the commission is now asking Congress to give it discretionary power to enjoin railways from advancing rates when it deems this desirable. A shipper or community may as easily be injured by having the rate of a competing shipper or community reduced as by having its own rate raised. Why, therefore, does not the commission ask for power to restrain either an advance or a reduction? Congress, in revising the tariff on foreign manufacturers, and thereby to a large extent fixing the prices of domestic manufacture, raises or reduces the rates as it thinks best.

The different attitude of the government toward manufacturers and toward railways would naturally raise the presumption that the level of prices of manufactured goods in this country is low and needs to be raised and supported, while the level of railway rates is high and needs to be depressed. But, in fact, the level of prices of manufactured goods is much higher in this country than anywhere in Europe, while the average freight rate per ton per mile in the United States is 7.6 mills and in Europe is over 14 mills. Does there not seem to be an anomaly in government protecting with one hand one class of industries in making exceptionally high prices, while reducing with the other hand the rates of another class of industries that is already making exceptionally low charges?

Manufacturers are large purchasers of transportation. As the tariff raises the prices that manufacturers can get for their goods, so railway regulation tends to keep down the prices for which they can buy transportation. On the other hand, railways are large purchasers of manufactured products. As railway regulation tends to reduce the prices they get for transportation, so the tariff raises the prices of the things they have to buy. While both policies tend to increase the profits of manufacturers, both seemingly tend to reduce the profits of the railways.

The railways are very large buyers, for example, of steel and iron products, especially steel rails. The export price of European rails varies from $20 to $24. If there were no tariff in this country, European rails easily could be shipped here and sold for $22 to $25 a ton, or even less. The United States Steel Corporation could easily meet these prices, for the cost of making rails in this country is lower, as Andrew Carnegie has said, than anywhere else in the world, being, according to different estimates for different mills, from $14 to $20 a ton. But there is a tariff of $7.84 a ton on foreign rails, which enables the domestic manufacturers to charge American railways $28 a ton. Suppose, now, that the railways, in order to recoup themselves for the high price they have to pay for steel rails, should advance their rates on iron and steel,

*Reprinted by permission from *The World Today*, August, 1909.

and the manufacturers should complain about it to the Interstate Commerce Commission. There is not much doubt, in view of what the Interstate Commerce Commission did in the Northwestern Lumber Rate cases, that in such an event the raise in freight rates would be held unreasonable and illegal.

There is a tariff on lumber and its products that bars the importation of these commodities from Canada and elsewhere. The railways buy immense quantities of lumber for stations and cattle pens, ties for tracks, etc. Between 1897 and 1907 the lumber manufacturers of the north Pacific coast, under the protection of the tariff, raised from 73 to 171 per cent. the prices of the various kinds of lumber that railways use. In November, 1907, the railways attempted to raise the freight rates on northwestern lumber and its products 15 to 25 per cent. The Interstate Commerce Commission held the advanced rates unreasonable and forbade the railways to collect them. Through the protective tariff the government enabled the lumbermen to raise from 73 to 171 per cent. the prices they charged the railways, though the Interstate Commerce Commission prohibited the railways from raising 15 to 25 per cent. the rates they charged the lumbermen.

One of the strongest arguments for a protected tariff is that by enabling manufacturers to get high prices, it enables them to pay high wages. But if manufacturers pay high wages railways must do likewise, or they will not get enough labor. And, in fact, the average salary-wage paid by railways seems to be higher than that paid by manufacturers. According to the special census of manufacturers for 1905, made by the Bureau of the Census, the average salary-wage in manufactures that year was $539. According to the statistics of the Interstate Commerce Commission, the average salary-wage paid by the railways in the same year was $607; and in the year ended June 30, 1907, the average salary-wage paid by railways was $640.

If it is necessary for the manufacturers of the United States to have protection and high prices in order to pay higher wages than the manufacturers of Europe, it seems pertinent to ask how the railways of the United States manage to get along while receiving much lower rates than the railways of Europe and paying wages not only much higher than those paid by the railways of Europe, but almost 11 per cent. higher than those paid by the protected manufacturers of the United States? Perhaps the fact that government statistics, as analyzed by Logan M. McPherson, show that in 1905 the net returns of the railways of the United States were 4 per cent. and the net returns of the manufacturers 15 per cent., may have some bearing on this question.

The explanation usually given of the wide difference between the way that government and public deal with manufacturers and with railways is that manufactories are strictly private concerns, while railways are quasi-public corporations and are therefore properly subject to strict public regulation and control. But this explanation is juridical, not economic or equitable. It tells why the government legally *can* deal differently with railways, but not why it *should* and *does*. Speaking morally and economically, it would seem that the government has as good a right to regulate and strictly control manufacturers whom by a protective tariff, it has enabled to build up large businesses, to charge high prices and to make large profits, as it has to regulate and strictly control railways because they are common carriers and exercise the power of eminent domain.

The true explanation of the difference between the ways that these two great industries are treated is historical. Thirty-five years ago national, state and municipal governments and the public vied in giving public lands, subsidies and exemptions from taxation to promote railway development, just as a protective tariff is now levied to foster the development of manufactures. The change in the treatment of railways is due largely to their own faults and offenses. Each railway passes through numerous communities where there is no other line. The roads in many instances abused their power by discriminating unfairly against the communities where they had a monopoly and in favor of communities where they met competition. They also wrongfully discriminated between shippers. Those who owned control of the roads usually lived distant from the properties and the people of many communities grew to regard them as oppressive absentee landlords. The result was the "Granger" agitation and legislation of the seventies, the Interstate Commerce Act of 1887, and the Elkins Act of 1903. This legislation made unfair discrimination of every kind unlawful.

The big shippers and the competitive points, finding that the unfair advantages they had enjoyed were being taken away, joined with the small shippers and the non-competitive points in demands for action to control and reduce all rates, which resulted in the Hepburn Act of 1906—giving the Interstate Commerce Commission power to reduce, but not to raise rates—and in the wave of state anti-railway agitation and legislation in 1907. The fundamental cause of all the legislation for the control of railways undoubtedly was the feeling of the public that they were natural monopolies against which any individual was powerless to protect himself, and that their power was being abused.

The manufactory, on the other hand, is not a natural monopoly. If it treats its customers unfairly, they can usually buy of somebody else. Formerly, it was a large manufacturing business that represented as big an investment as a small railway. People, therefore, did not fear the power of manufacturers as they feared that of railways. The owner of the factory formerly was usually a citizen of the immediate community, in whose success his neighbors took a personal interest and pride. Manufacturers are also larger employers of labor than railways. The investment represented by manufacturers and railways in this country in 1905 was almost the same, being for the former $13,870,000,000, and for the latter $13,805,000,000. Th railways paid a higher average wage and laid out a larger percentage of their gross earnings in wages. But the total number of persons employed by manufacturers was 6,700,000, as compared with 1,400,000 employed by the railways. Manufacturers also have always taken more pains to show their employees wherein their interests are mutual and consequently a large majority of the employees of protected industries can always be relied on to vote for candidates who favor a protective tariff.

In recent years some important changes have been taking place in manufactures. Large combinations and corporations have been getting practical monopolies of several lines of manufacture, and the individual farmer or merchant has begun to feel as helpless in dealing with them as he formerly felt in dealing with the railway. Some of these combinations and corporations have abused the power derived from monopoly and the protective tariff by charging higher prices and making larger profits than the public thinks justifiable. Largely owing to these causes, a strong public sentiment has developed in favor of revision of the tariff downward, especially on foreign articles competing with domestic articles made by trusts, and of some form of strict regulation of these concerns. Meantime, railway managers and owners, chastened by experience, have begun to deal with the public with unwonted tact and circumspection, and to enlist their employees in a campaign against what they regard as unfair regulation.

Whether the result will be a different policy by the government in reference to either manufactures or railways only time can tell. But there are certain very important economic facts and principles that public and government, in dealing with these great industries, cannot afford to disregard. There is always a large amount of capital that will be invested in the line of industry that offers the largest probable return. If public policy tends to attract capital to one line of industry and to repel it from another, the amount invested in the former is apt to be disproportionately large and in the latter

unduly small. This will hurt the unfavored as well as the favored industries.

Some years ago railway development in the United States, owing to artificial stimulation, outstripped the growth of commerce, and manufactures remained relatively backward, while half the roads in the country became bankrupt from want of traffic. Should the growth of manufactures in future, from any cause, exceed the increase of facilities of transportation, investors in manufactures would suffer heavy loss through inability to get fuel and raw materials to the factories and finished products from the factores to the markets. It is equally requisite to the prosperity of the country that the railways shall have plenty of traffic to haul and that producers shall be afforded facilities ample to handle the traffic available.

PROGRESSIVE SAFETY.*

BY A. H. SMITH,
Vice-President, New York Central Lines.

Mr. Smith first outlines the history of railroading in general and then makes an excellent summary of the development of railway equipment and of the main elements of railway operation. He traces the growth of these to show what he calls the adjustment of safety to progress. He takes up, in order, the air-brake, the automatic coupler, block signals, interlocking, train despatching, locomotives, cars, bridges, rails, grade crossings, examination of employees, and the formation and aims of the American Railway Association. He continues:

That this progress has been accompanied by increased safety is demonstrated by common knowledge and confirmed by the records both of the railways and of the public authorities. As an illustration, take the statistics of the Interstate Commerce Commission. For the decade following the beginning of the records, namely, 1888-1897, the fatalities were 1 in 45,300,000. For the next decade, bringing it down to the present time, the fatalities were 1 in 54,900,000; the gain in ratio being, for the nation at large, fully 20 per cent. In the state of New York, where the density of travel is considerably in excess of that of the country as a whole, we find a report of the state engineer in 1862 showing fatalities of 1 in 28,200,000. The average for six years, 1902 to 1907, inclusive, shows 1 in 200,000,000; an increase of 800 per cent. in relative safety.

We may assume that never before in the history of railway transportation was there presented a bigger problem than today. The weights are greater; the distances are greater; the speed is greater; the population is more dense; prices and wages are higher, and the public service is more exacting. A gathering of the official representatives of the nation and of every state, possibly with a desire to uniform and concerted action, even though it may be unofficial, points with emphasis to the attitude from which the public contemplates the employment of the railways in their behalf. It is, I believe, an accepted fact of our political constitution at the present time that the public, through its authorized representatives and through lawful channels, has a right to be reasonably assured in this respect. I believe that the co-operation manifested, as well as the inquiries by the various railway boards, has in a great sense aided in our reaching the present standard of excellence to which we can point with pride in comparison with any other national railway system of the globe. We are becoming more familiar—the railway managements and employees—with the standpoint of the public, and the public is becoming more familiar with the problems of the railways. The mutual aim is: first, safety and service; second, economy. The public concern for the safety and service is for its own protection, and the railway management must give both with economy.

It might not be amiss to express the hope that such needs as cannot be met without the active support of public opinion, and perhaps legislation, will be clearly brought out. One of the thoughts that occurs to me was suggested by a recent exhibit from the records of the loss of life, damage to railway property, as well as injury to persons and property transported, due to the presence of unauthorized persons on railway property, whether wilfully or carelessly trespassing. Last year over 5,000 trespassers lost their lives on railways, besides a large number injured. Numerous mishaps have been traced to acts of trespassers, which may be the secret of many unexplained casualties. The railways are a highway for the migrations of tramps and unemployed persons, who commit petty depredations and jeopardize the safety of trains and the lives of employees and passengers. It seems of no avail that thousands of the worst class are arrested by railway police forces and convictions secured; the sentences in the majority of cases serve rather to aggravate, than mitigate, the evil. One line arrested over 9,000 trespassers during the past year, and secured convictions in 75 per cent. of the cases; but in half of them sentence was suspended, which usually meant that the offender used the railway to escape from the scene. I do not wish to be understood as aspersing the administration of justice, nor as insisting that offenses of a serious character are always committed by railway trespassers. But the hazard involved is one that should not be permitted to exist, the railway property destroyed or damaged bearing no relation to the risk of persons and property transported and to the enormous loss of life involved. I might venture to suggest that the loss of life is far greater than entailed through decades by boiler explosions or rear end collisions, the seriousness of which I do not wish to deprecate; and the situation might warrant special record of the facts being obtained in behalf of the public through the regular channels. As I see it, the great problem is to make our progress sure, taking no doubtful measures, adopting no specious devices which may appeal to us at first blush until we have satisfied ourselves that no greater risk is involved by the change.

The multiplication of rules enjoining obedience, together with devices for additional protection, may yield a false sense of security if fundamental obedience to existing rules and efficiency of existing appliances is one bit impaired by the addition. We must not embrace paper reforms, even though clamor and pressure be great. An "ounce of prevention is better than a pound of cure," we grant; but reverse the proverb, and the pound of prevention may overwhelm us. Improvement in general safety and character of railway operation must be the product not only of an enlightened public opinion and the conservative wisdom of public representatives, but of progressive and careful management, coupled with a sense of discipline and responsibility and industry of railway employees, who must jointly share the obligations of the problem.

Speaking of the compliance we have cheerfully made to the suggestions of the public representatives—the commissions—in regard to improvements of service, facilities and conditions of operation, etc., we believe in the long run that these things mean a better standard and greater security for railway property, as well as the enormous benefit that accrues to the public by reason of proper and efficient railway service, and we have only admiration for the attitudes of the commissions as we have found them. They have a large problem. We are glad to avail ourselves of their wisdom, and believe it to be the means whereby the responsibility of the carriers to the public is secured, and through whom the responsibility of the public to the railways must be voiced.

*From an address delivered before the National Association of Railway Commissioners at Washington, D. C., November 16.

A concession has been granted by the government of Paraguay to Guaggiari, Gaona & Co. to build and operate a railway, which is to run from Concepcion, through the Belén district, to Horqueta. The company is allowed to forward, duty free for 25 years, all the material required for building and operating the line.

General News Section.

The Western Pacific was opened for freight traffic on December 11.

In the severe storm of December 9 and 10, car ferry No. 2, of the Marquette & Bessemer line, was lost on Lake Erie, with its crew of 30 men. In the same storm the steamer Clarion was destroyed by fire and 13 of her crew were lost.

The Lake Shore & Michigan Southern and the New York, Chicago & St. Louis have made arrangements with the Rock Island whereby, pending the elevation of the tracks at Grand Crossing (Chicago) all the trains of the N. Y., C. & St. L. and some of the suburban trains of the Lake Shore use the Rock Island tracks from Stony Island avenue to La Salle street station.

The Brooklyn Rapid Transit Company, operating the surface and elevated street railways in Brooklyn, N. Y., and employing about 10,000 conductors and motormen, has announced an increase of about $3 a month in the wages of all conductors and motormen who have been in the service six years and have no demerits standing against their names. It is said that between 1,500 and 2,000 will receive the increase.

The Southern Pacific-Union Pacific will begin to run trains into Seattle over the Northern Pacific on January 1, the agreement between the Union Pacific and the Northern Pacific for use by the Harriman lines of the Northern Pacific's track between Portland and Tacoma having at last been signed. Between Seattle and Tacoma the track built by the Chicago, Milwaukee & Puget Sound will be used, in which a half interest has been bought. The work of double-tracking the Northern Pacific between Portland and Tacoma will be pushed as fast as practicable, as the road already does a large business for a single track line.

The only news from the Northwest concerning the switchmen's strike during the past week has consisted of brief items telling of the resumption of normal service. The president of the Switchmen's Union visited Mr. Gompers and secured a promise of aid, but no satisfactory information is given out as to what the aid will be. The Amalgamated mines at Butte, Mont., which were closed when the strike began, resumed work December 15, and on the same day those switchmen of the Great Northern Railway in that city who are members of the Brotherhood of Railway Trainmen voted to return to work; and the switchmen of the Northern Pacific are said to have taken similar action. This item would seem to indicate that Butte was the stronghold of the strikers, as the reports from all other cities indicated that the restoration of normal freight service was practically complete fully a week earlier. In New York City it is reported that the members of the Brotherhood of Locomotive Engineers intend to ask for an increase of pay on the railways generally next month.

The Committee on Interstate and Foreign Commerce of the lower house of Congress this week reported favorably the bills of Mr. Esch, of Wisconsin, to empower the Interstate Commerce Commission to investigate accidents (H. R. 3649) and to require the use of standard sill steps, hand-brakes, ladders, running-boards and grab-irons on all freight cars (H. R. 5702). Both of these bills were presented in the Sixtieth Congress and were passed by the House, but not by the Senate. There are two important changes in the accident bill and none in the freight car bill, except to change the date of going into operation to July 1, 1911, and the cutting out of the clause in Section 3, which empowered the Interstate Commerce Commission to modify the requirements of that section. The accident bill re-enacts the present accident law, amended so as to include accidents to "others," as well as to passengers and employees, and empowering the Commission to investigate all accidents resulting in serious injury to persons or property. The freight car bill makes it unlawful to run a car not properly equipped in the features mentioned, and empowers the Interstate Commerce Commission to designate the number, dimensions, location and manner of application of the appliances named.

Expenditures on the Grand Trunk Pacific.

A statement presented to the Canadian Parliament by Hon. George R. Graham, Minister of Railways, as to the expenditures on the construction of the Grand Trunk Pacific Railway shows that the section built from Winnipeg, west to Wolf Creek, a distance of 915 miles, cost up to September 30 $33,423 per mile and that the work will cost $1,557 per mile more to complete. On the section now being constructed between Wolf Creek and Prince Rupert, the Pacific Coast terminus, about 836 miles, $703,863 has been spent and a further expenditure of $60,002,136 will be required. The estimated expenditure on the section between Superior Junction and Winnipeg, 246 miles, is $85,003 per mile, not including terminals and shops at Winnipeg. The estimated cost of the section between Moncton, N. B., and Quebec, a distance of 460 miles, is $26,933,902, of which $17,334,113 has been spent. This does not include the cost of the Quebec bridge and terminals.

Electric Trucks for Baggage and Freight.

The Pennsylvania Railroad is building at the Altoona shops 25 electric-motor baggage trucks for use in the new passenger station at Seventh avenue, New York City. The design of these trucks is the result of experiments which have been made on the Pennsylvania for the last six years, the first electric baggage truck having been put in use in Jersey City in 1903. One form of truck was illustrated in the *Railroad Gazette* of June 14, 1907, page 845. The new trucks are to be controllable from either end, and the wheels will be mounted at the extreme ends, so that the floor of the truck will be only 9 in. from the ground or platform. In the new station the baggage-car floors will be about this height above the platform. The interesting experiments which have been made by the Pennsylvania Railroad in this field are described in a paper by T. V. Buckwalter, which was read before the Engineering Club of Altoona last month. Mr. Buckwalter is the patentee of numerous improvements on these vehicles. In his paper he discussed all kinds of vehicles which are propelled by their own power, but are not to be run exclusively on tracks.

There has been in use for some time in Pittsburgh by the Pittsburgh Railways Company a freight truck which takes its power from the trolley wire when running along a trolley track, but which carries a storage battery for use after leaving the railway. This has not as yet been successfully developed on account of the wide range of voltage for which it must be adapted.

Between two Pennsylvania Railroad freight houses in Philadelphia, where formerly two or more freight cars were run regularly, to transfer about 14 tons of freight daily, an electric motor truck to run through the streets has been substituted for the freight cars, with a great advantage in quickness and economy.

At Broad Street Station, Philadelphia, the Pennsylvania is using, experimentally, six different kinds of passenger taxicabs, two of each kind. These are the Thomas, the Devon, the Sultan, the Franklin and the cabs of the Quaker City Cab Company, made by the American Locomotive Company. All of these are gasolene cars. The Thomas cabs have been in successful use a year and a half; the others for shorter times. The experiment, as a whole, is called successful, although there have been some break-downs, due to defective design.

The New York Transportation Company (New York City), whose electric cabs seem to have proved a failure, was forced to import 500 gasolene taxicabs to hold its passenger business against competitors. The superiority of the gasolene vehicles is due to their lighter weight and greater power in proportion to carrying capacity, resulting in easier control and an easier riding vehicle. Mr. Buckwalter quotes a prediction, made by himself three years ago, that by this time gasolene

taximeter cabs would have largely replaced horse-drawn vehicles in New York.

An electric truck of two tons' capacity is being built, to be used in carrying castings and other freight from foundries to shops, etc., at Altoona. Mr. Buckwalter points out how, in many situations, a truck is more convenient and economical than the "industrial railway" in large shops. He also thinks favorably of motor trucks for delivering freight to consignees. In Baltimore and Washington the Pennsylvania gives store-door delivery on certain kinds of freight. In Baltimore 35 two-horse wagons are maintained, and in Washington a larger number. Efficient delivery will hold business which otherwise might go to competing roads having freight houses more conveniently located. Washington, with a population of 300,000, requires a freight house no larger than that of Altoona, with only 50,000 population. The general use of motor trucks is the only relief in sight for the congested condition of the streets of New York City.

The baggage trucks put in use at Jersey City six years ago, weighed four tons and had a capacity of only two tons, and they were too large to turn around on the platform. The next experiment was in the use of electric motors on the ordinary four-wheel baggage truck, the first of which was made by the McCrea Motor Truck Company, of Cleveland, Ohio. The first trucks made at the Altoona shops were 12 electric trucks, to carry mail bags, for use at the Washington terminal. These embodied improvements which, by the experience with the earlier trucks, had been shown to be desirable. These are 9 ft. long, 42 ft. wide and 39 in. high; height to the top of the end standards, 78 in. These trucks weigh 2,280 lbs. The driver's platform, at the end, folds underneath the body when not in use. The 12 trucks built later for Jersey City were put in use this last summer. These are 12 ft. long, weigh 2,390 lbs. each and have a capacity of 4,000 lbs. The batteries are transferred quickly, so that the trucks are kept in operation 24 hours a day. The batteries were made by the Willard Storage Battery Company, Cleveland, Ohio.

Mr. Buckwalter has designed an electric truck for use in freight houses. This design is to be made only 6 ft. long, so that the truck can be turned inside a freight car.

Discussion of Proposed Electrification of Chicago Railway Terminals.

George Weston, representative of the city of Chicago on the board of engineers which is supervising the construction of the Chicago Traction System, is quoted as follows regarding the proposed electrification of railway terminals in Chicago in an interview in the Chicago *Record-Herald*:

"There are two objections made by the railways—the cost and the danger to employees. I do not believe that the cost would approximate anything like the sum named, and I am not convinced that the figures given by the railway employees on the number of accidents on the New York terminals are correct. * * * We have interurban railways operating all over the country on the third rail plan and we do not hear of them killing their employees or any one else. We have few accidents from the third rail on our elevated railways. It will take years to bring about electrification of even the passenger business, as it did to compel the railways to elevate their tracks, but that is no reason why the city should give the idea up."

A conference on the subject of proposed electrification was held between the local transportation committee of the Chicago city council and a number of railway officers on December 8. L. C. Fritch, formerly consulting engineer of the Illinois Central and now chief engineer of the Chicago Great Western, suggested that a commission composed of representatives of the city and of the railways be appointed to give the whole subject thorough investigation. Besides the matter of fuels Mr. Fritch thought this commission should study the subject of a central arrangement of passenger terminals and of an arrangement of freight terminals so that all freight which it is not necessary to haul through the city shall be hauled outside it on belt railways.

F. A. Delano, president of the Wabash, contended that it is unreasonable to ask the railways to suppress smoke when the city does not prevent it in its own power plants and when citizens do nothing to prevent the emission of smoke from their residences. In a country where soft coal is produced in such quantities as in Illinois it is the natural fuel of the railways. Anthracite is too expensive for use by western roads. Coke might become practicable if plants were built to develop and use its by-products. He referred to the steel plant at Gary, where gas is utilized for the production of electricity. It is up to engineers to discover some means whereby electrical power can with safety be adapted to the use of large commercial enterprises. He believed the application of electricity to the operation of freight terminals to be out of the question.

F. B. Harriman, general manager of the Illinois Central, stated that his road had tried all the smoke consuming contrivances it could find and had eliminated 99 per cent. of the smoke formerly produced by its locomotives.

Generous Treatment of Employees.

Vice-President Parsons, of the General Electric Company, testifying last week before the New York legislative commission, which is investigating employers' liability laws, said that only two lawsuits had been started by employees against his company in ten years. At the plant in Schenectady there are 12,500 employees. Every accident is reported to the head office and taken note of by the law department. In the year 1908 there were 1,618 accidents. Of these only 412 resulted in disability of more than five hours, while there was only one fatal accident that year. The company carries no insurance on its employees, except in a few special instances, and has adopted the policy of voluntary settlement.

A. F. Lyman, general attorney for the New York Central, said that his company employed about 50,000 men and had a system of compensating employees who were disabled for more than three days. In fatal accidents, when there is no legal liability, the company allows the family of the dead man a gratuity of $250.

James L. Quackenbush, general attorney of the surface, elevated and subway lines of New York City, said that there were fully 10,000 people in New York engaged in preparing and presenting claims against the railway companies. These include lawyers, ambulance chasers and persons in their employ.

A Big State with a Small Railway.

E. A. Goodridge, on retiring as assistant general manager of the Texas State Railroad, submitted a report to the Penitentiary Board regarding the condition of the property. He said that when he was appointed on July 1 the property was in an unorganized condition, and the bookkeeping chaotic. The roadbed and track are nearly new, but Bean creek bridge and one other need rebuilding. To comply with the state law, one of the engines has been equipped with an electric headlight, and another headlight is coming. All three engines will be equipped with automatic ashpans as soon as the ashpans are received, which will be about January 1, 1910. The total earnings from July to November, inclusive, were $15,620, the operating and maintenance expenses $9,679, and the income from operation $5,941.

The foregoing indicates that the results of the state's venture in the railway business are not altogether satisfactory. Mr. Goodridge says further: "Unless earnings pick up the State Railroad will fail to earn 6 per cent. on the lowest valuation; in fact, it will fail to produce 6 per cent. by $9,084. The Penitentiary Board will probably have to draw on other penitentiary funds to meet the interest charges and take up the bonds as they mature."

Dinner to E. P. Ripley.

The Commercial Club of Topeka, Kan., gave a dinner in honor of E. P. Ripley, president of the Atchison, Topeka & Santa Fe at Atchison, Kan., on December 10. Scott Hopkins, president of the club, was toastmaster, and speeches were made by a number of citizens of Topeka, including P. I. Bonebrake, T. F. Doran, T. W. Borman, S. E. Lux, Frank P. Mac-

Lennon and Charles S. Gleed. At the conclusion of the speech-making Mr. Ripley was presented with a silver loving cup. Mr. Ripley spoke briefly, expressing his appreciation of the honor shown him and referring particularly to the work that the road is doing to better the condition of its employees. He said he was proud of the loyalty the employees showed to the road and of the excellent team work that they do. He referred to the fact that the Santa Fe pays $1,000,000 in taxes in Kansas. It has large investments in that state and it proposes to make more; and all it asks in return from the state is justice. He said it had not always got this, but that he had great hopes for the future. He believed the attitude of the public toward railways would change as soon as the people thoroughly understood the great economic questions which are now up for solution.

Valuing Nebraska Railways.

E. C. Hurd, engineer in charge of the physical valuation of railways being made by the Nebraska Railway Commission, has submitted his report to the commission. He assumed the duties of his office on May 20, and his expenditures to November 30 had been $6,570. He has prepared forms in which the railways are to make reports and has organized his work. Mr. Hurd states that his work up to date has been as follows: Station maps and right-of-way maps, covering 1,380 miles of roadway, have already been received from the several respondents, also profiles giving detailed information covering 715 miles of roadway. Three hundred and forty-seven copies of standard plans of roadway, bridges, buildings and structures are also in hand, nearly the whole of which has been canvassed for the purposes desired. Much more of this class of information is undergoing preparation and will be furnished promptly. Field inspection and local investigation covering 1,876 miles of right-of-way, especially mentioning twenty-seven of the more important towns, has been accomplished, while 1,580 miles of roadway, including the bridges and structures thereon, have been inspected, necessitating 1,511 miles of additional travel. Excerpts from the records of real estate transfers of property lying adjacent to the different railway lines within sixty-six counties have been procured, and within the remaining twenty counties the same is being prepared. Card correspondence information of land values in all the counties having railways within their borders, the same furnished by local parties well versed in the knowledge of such values, has been secured.

P. R. R. a Game Protector.

The locust groves planted on abandoned ground by the Pennsylvania Railroad have turned out to be great places for preserving rabbits for the next year's crop. The thickets are too jaggy for pot hunters to shoot them in the squats, while they baffle dogs among the small trees and refuse to leave their retreat to be shot.—*Philadelphia Record.*

American Society of Civil Engineers.

At the meeting on December 15 two papers were presented for discussion as follows: "The New York Tunnel Extension of the Pennsylvania Railroad: The East River Tunnels," by James H. Brace, Francis Mason and S. H. Woodard, Members, Am. Soc. C. E., and "The New York Tunnel Extension of the Pennsylvania Railroad: Contractors' Plant for East River Tunnels," by Henry Japp, M. Am. Soc. C. E.

American Association of Refrigeration.

Albert M. Read, Washington, D. C., chairman of the executive committee of the American Association of Refrigeration, announces the completion of the American sections of the five International Commissions to study questions considered at the First Congress of Refrigeration held in Paris last year, and to prepare reports for presentation at the Second International Congress of Refrigeration to be held in Vienna in 1910. The American chairmen of commissions are as follows: No. 1, Liquefied Gases and Units, Dr. D. S. Jacobus, New York; No. 2, Methods of Testing Refrigerating Machinery and Insulating Material, John E. Starr, Starr Engineering Co., New York; No. 3, General Application of Refrigeration, H. C. Gardner, Swift & Co., Chicago; No. 4, Railway and Steamship Refrigeration, E. O. McCormick, Union and Southern Pacific, Chicago; No. 5, Legislation, W. H. Gibson, President F. C. Linde Company, New York. The railway men on Commission No. 4 in addition to the chairman are J. M. Culp, W. B. Biddle, Carl Howe and E. F. McPike. Mr. McPike, who is in charge of refrigeration service on the Illinois Central, is the chairman of the press committee of the association. His office is at 1 Park Row, Chicago.

Railway Supply Manufacturers' Association.

The office of the Secretary of the Railway Supply Manufacturers' Association has been moved from Chicago to room 304 in the German National Bank building, Pittsburgh, Pa. All correspondence intended for the secretary, John D. Conway, should therefore be sent to the new address.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston Mass.; May 10-13; Indianapolis.
American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa. June, 1910; Niagara Falls, Ont.
American Assoc. of Local Freight Agents' Assn's.—G. W. Dennison, Penna. Co., Toledo, Ohio.
American Institute of Electrical Engineers.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
American Railway Association.—W. F. Allen, 24 Park Place, New York; May 18; New York.
American Railway Bridge and Building Association.—S. F. Patterson, B. & M., Concord, N. H.
American Railway Engineering and Maint. of Way Assoc.—E. H. Fritch, Monadnock Bldg., Chicago, March 14-17, 1910; Chicago.
American Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis; second Tuesday, May; Memphis, Tenn.
American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony Building, Chicago; June 20-22; Atlantic City.
American Society for Testing Materials.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; New York.
American Street and Interurban Railway Association.—B. V. Swenson, 29 W. 39th St., New York.
Association of Am. Ry. Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago; June 29, 1910; Colorado Springs.
Association of Railway Claim Agents.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; May; Nashville, Tenn.
Association of Railway Telegraph Superintendents.—P. W. Drew, Wisconsin Central Ry., Chicago; May 16-20, 1910; Los Angeles.
Association of Transportation and Car Accounting Officers.—G. P. Conard, 24 Park Place, N. Y.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
Freight Claim Association.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.; June 15, 1910; California.
International Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York.
International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago; May; Chicago.
International Railway General Foremen's Association.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.; May; Cincinnati.
Iowa Railway Club.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
Master Car Builders' Association.—J. W. Taylor, Old Colony Bldg., Chicago; June 15-17; Atlantic City.
New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York.; 3d Friday in month, except June, July and August; New York.
North-West Railway Club.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
Railway Club of Pittsburgh.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
Railway Signal Association.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio; May 16-18; St. Louis.
Roadmasters' and Maintenance of Way Association.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
Society of Railway Financial Officers.—C. Norquist, Chicago.
Southern Association of Car Service Officers.—J. H. O'Donnell, Bogalusa, La.
Southern and Southwestern Ry. Club.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R. R. R., East Buffalo, N. Y.
Western Canada Railway Club.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Monday, except June, July and August; Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
Western Society of Engineers.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The bi-weekly report of car surpluses and shortages to be issued by the American Railway Association Saturday, December 18, will show further decreases in car shortages and further increases in car surpluses.

The Canadian Passenger Association has reaffirmed its decision of a year ago not to make reduced rates for the Montreal ice carnival or for anything which may serve to foster the notion that Canada is a very cold place.

According to the New York reporters, the Chesapeake & Ohio, the Baltimore & Ohio, the Pennsylvania and the Erie are getting their courage up to make a reduction in fare between Cincinnati and New York, unless they can induce the New York Central to increase the fare on its new fast train.

The traffic officers of railways entering Chicago have finally decided to impose a charge of 2 cents per 100 lbs. on all less-than-carload freight delivered to a railway by tunnel or from a private siding or from a river lighter. The imposition of this charge has been under consideration for some time. It will tend to equalize the freight charge imposed on the small shipper who has to team his freight to the railway station.

The Milwaukee Northern Electric Railway announces that on and after Dec. 24, 1909, rates of fare on its interurban lines will be increased 10 per cent. The increase is made necessary by the fact that the taxes paid to the state of Wisconsin for the year 1909 amount to more than 8 per cent. of the total receipts of the company from all sources. The Wisconsin Railway Commission intends to formally inquire into the increase.

The traffic bureau of the Kansas City Commercial Club favors the amendment of the Interstate Commerce act in several particulars. It would have the number of commissioners increased; would require that a certain number of the members of the commission should be traffic experts who have had experience in the railway business, and would have the salaries of the commissioners increased so that they would be large enough to attract expert railway men.

The number of loaded cars moved over the New York Central Lines in the month of November was 1,802,287, which is 295,746 more than in the corresponding month of 1908. This statement includes all of the lines in the New York Central system. For the principal roads the totals and the increases were, in round numbers: N. Y. C., 604,000, increase 81,000; B. & A., 92,000, increase 11,000; Lake Shore, 357,000, increase 48,000; Michigan Central, 228,000, increase 32,000; C., C., C. & St. L., 238,000, increase 40,000.

The Western Passenger and the Southwestern Passenger Association lines have decided that after January 1 they will not make any fares for the federal government lower than the normal one-way colonist fares. Of course, a deduction will have to be made from fares on lines which have received land grants under the condition that they shall charge the government only 50 per cent. as much as they charge ordinary passengers. When the government has a large body of troops to move it always asks bids from the different roads and moves the troops over the line that makes the lowest bid.

The Atchison, Topeka & Santa Fe has made a reduction in rates on wool from the west to Chicago, which makes the rate to Chicago 2½ cents less than that to St. Louis. Some time ago the National Wool Stores & Warehouse Company was organized to build large warehouses in Chicago and attract wool to that market. The railways promised to make rates which would put Chicago on the same basis as St. Louis, it being possible up to the present time to ship wool from the west to St. Louis and thence east for a lower rate than it could be shipped to Chicago and out. It is understood that other roads will follow the example of the Santa Fe.

Condition of the Cotton Crop.

The crop reporting board of the United States department of agriculture estimates that the total production of cotton in the United States for the season of 1909-10 will amount to 4,826,344,000 lbs. (not including linters), equivalent to 10,088,000 bales of 500 lbs., gross weight.

The estimated production in 500-lbs. gross weight bales, by states, is as follows:

Virginia	10,000
North Carolina	615,000
South Carolina	1,095,000
Georgia	1,800,000
Florida	57,000
Alabama	1,020,000
Mississippi	1,020,000
Louisiana	280,000
Texas	2,570,000
Arkansas	715,000
Tennessee	240,000
Missouri	49,000
Oklahoma	617,000
United States	10,088,000

INTERSTATE COMMERCE COMMISSION.

Different Grades of Brick Given the Same Rate.

Metropolitan Paving Brick Co. et al. v. Ann Arbor et al. Opinion by Chairman Knapp.

There is no transportation reason for making different rates on different grades of fire, building and paving brick. In so far as it was held in the Stowe-Fuller case (12 I. C. C., 215) that one rate should be applied to fire, building and paving brick on shipments between the points involved, the conclusion then reached is sustained by further and more exhaustive inquiry. The Chicago-New York base rate to be applied on fire, building and paving brick on shipments eastbound from Central Freight Association territory to Trunk Line territory should not exceed 21 cents per 100 lbs., and any charge in excess thereof is unreasonable. No order, however, for reparation is warranted. (17 I. C. C., 197.)

Advance of Local Rates Unreasonable.

New Orleans Board of Trade, Limited, v. Louisville & Nashville Railroad Company. Opinion by Commissioner Clements.

Defendant advanced its rates on certain classes from New Orleans, La., to Mobile, Ala., and Pensacola, Fla., to make the sums of the locals equal the through rates from New Orleans to Montgomery, Selma and Prattville via Mobile and Pensacola; held, that the rates resulting from these advances were unreasonable. Former rates have been in effect, substantially unchanged, for over 20 years, and there was no evidence that they were not compensatory. Neither by comparison with other rates nor by any facts appearing are the advanced rates shown to be reasonable. The through rates from New Orleans via Mobile and Pensacola to Montgomery, Selma and Prattville, on certain classes, held to be unreasonable and excessive, and reduced to the sum of the locals. (17 I. C. C. 231.)

Rebilling at East St. Louis.

Acme Cement Plaster Co. v. Chicago & Alton et al. Opinion by Commissioner Prouty.

Complainant shipped a carload of cement plaster, containing 60,000 lbs., from Acme, Tex., to East St. Louis, Ill., the rate in effect being 18 cents per 100 lbs. from Acme to East St. Louis, with a minimum of 30,000 lbs., and a rate of 23 cents from Acme to Brainwood, Ill., with the same minimum, the shipment going forward on the 18-cent rate. When the car reached East St. Louis it was ordered by complainant to its warehouse and the 18-cent rate was paid. Complainant removed one-half of the carload and rebilled the car to Brainwood. The tariff did not provide for reconsignment at East St. Louis. The local rate from East St. Louis to Brainwood of 9 cents per 100 lbs. was assessed. Complainant insists that the balance of the through rate, or 5 cents per 100 lbs., should have been collected, and makes claim for 39 other shipments delivered at various points under similar conditions; held, that the shipment from East St. Louis to Brainwood was a state movement, and the carrier had no right to allow it to go forward at the balance of the through rate. *Gulf, Colorado & Santa Fe Ry. Co. v. Texas*, 204 U. S., 403, cited and followed. Complaint dismissed. (17 I. C. C., 220.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1909.
(See also issue of December 10.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Atlanta, Birmingham & Atlantic....	641	$179,589	$44,632	$237,437	$24,420	$31,482	$11,485	$84,086	$9,666	$161,139	$76,298	.....	$8,000	$68,298	$17,142
Bangor & Aroostook.....	530	178,379	64,910	256,084	39,120	32,417	2,765	72,279	10,619	157,200	98,884	.....	1,500	97,384	—21,174
Buffalo, Rochester & Pittsburgh.....	567	676,212	83,013	800,898	107,806	162,584	8,400	214,252	13,768	506,810	294,088	—$173	13,000	280,915	28,185
Central of Georgia	1,916	881,833	258,025	1,251,257	159,626	162,170	29,133	322,383	42,524	715,836	535,421	6,056	47,400	494,077	100,254
Chicago Great Western R. R.....	1,510*	810,129	235,174	1,116,054	120,657	114,871	39,799	405,271	33,732	714,330	401,724	985	27,319	375,390	.....
Chicago, Indianapolis & Louisville..	616	373,297	122,584	537,236	70,824	61,505	14,888	167,029	13,177	327,423	209,813	.....	20,500	189,313	39,269
Chicago, Milwaukee & Puget Sound..	1,400†	903,015	113,019	1,029,687	36,264	55,403	21,322	268,641	13,088	394,718	634,969	5,677	20,000	620,646	.....
Chicago, Milwaukee & St. Paul.....	7,511	4,700,209	1,435,873	6,553,305	772,856	697,916	120,390	2,217,392	93,394	3,901,948	2,651,357	36,484	206,637	2,481,204	33,399
Denver & Rio Grande.....	2,553	1,681,598	502,362	2,269,460	273,270	355,791	45,102	762,273	43,537	1,479,973	789,487	5,663	71,000	724,150	127,999
El Paso & Southwestern Co.....	867	473,377	84,767	584,996	81,441	77,031	10,980	156,616	21,913	347,981	237,015	—423	17,167	219,425	—16,907
Elgin, Joliet & Eastern.....	770	749,622	33	810,209	87,390	158,901	4,528	226,090	12,178	489,087	321,122	.....	13,500	307,622	. 90,201
Galveston, Harrisburg & San Antonio	1,338	703,994	231,392	985,448	113,921	128,980	26,446	354,062	27,662	651,071	334,377	—4,667	28,179	301,531	7,632
Grand Rapids & Indiana.....	591	280,120	126,342	440,026	53,271	69,696	12,239	169,325	14,094	318,625	121,401	—1,666	20,837	98,898	—12,824
Houston & Texas Central.....	789	443,119	146,132	625,067	72,724	58,437	22,395	215,468	19,284	388,308	236,759	.....	9,404	227,355	—21,404
Lake Erie & Western.....	886	412,938	69,382	505,274	74,179	78,733	10,262	162,658	9,423	335,255	170,019	.....	18,271	151,748	71,405
Long Island	391	312,721	463,154	812,565	85,045	102,466	17,073	335,915	19,566	560,065	252,500	82,240	33,232	301,508	78,325
Maine Central	932	480,077	254,878	782,135	133,930	108,572	9,566	250,947	20,632	523,647	258,488	—807	39,141	218,540	23,934
Michigan Central	1,746	1,851,646	606,580	2,700,718	365,629	272,190	66,838	877,635	37,065	1,619,357	1,081,361	—2,759	94,000	984,602	234,190
Mobile & Ohio.....	1,114	706,595	110,822	937,613	117,295	167,814	29,658	291,995	31,307	638,069	299,544	—2,936	24,561	272,047	—69,043
Nashville, Chattanooga & St. Louis..	1,230	730,748	218,941	1,009,213	149,816	157,116	33,503	347,974	23,695	712,105	297,108	1	20,500	276,609	34,763
New York, Chicago & St. Louis.....	558	825,211	126,910	984,127	73,279	60,624	48,414	355,652	13,476	551,445	432,582	—1,072	33,000	298,610	86,412
New York, Ontario & Western.....	546	565,932	110,510	702,628	86,825	106,141	9,822	259,986	15,473	478,247	224,381	—1,788	19,167	203,426	34,233
Northern Central	466	984,214	195,419	1,238,555	81,353	204,868	13,650	479,245	19,989	799,105	439,450	1,354	24,708	416,096	151,273
Oregon R. R. & Nav. Co.....	1,327	1,043,713	392,822	1,507,695	157,219	98,592	27,151	428,058	31,199	742,219	765,476	—1,391	42,190	721,895	105,662
Oregon Short Line.....	1,508	1,371,474	477,792	1,949,472	138,280	134,068	23,102	378,247	30,217	703,914	1,245,558	910	50,000	1,196,468	179,892
Philadelphia & Reading.....	1,024	3,257,798	581,985	4,000,118	280,803	831,901	40,279	1,090,689	56,357	2,300,029	1,700,089	29,536	73,495	1,656,130	68,474
Phila., Balto. & Washington.....	716	814,391	601,098	1,556,957	224,276	278,132	25,088	576,309	28,949	1,132,754	424,203	.....	35,772	388,431	48,130
St. Louis Southwestern.....	773	573,090	127,278	731,045	98,161	99,357	26,137	149,039	21,139	393,833	337,213	—577	23,395	313,241	70,551
St. Louis Southwestern of Texas....	697	296,222	94,934	417,240	82,419	68,686	11,179	140,653	16,898	319,835	97,405	60	8,333	89,132	31,347
San Antonio & Aransas Pass.....	727	297,168	87,122	403,284	54,447	40,764	4,828	131,746	9,195	240,980	162,304	.....	9,000	153,304	—16,724
San Pedro, Los Angeles & Salt Lake.	1,105	402,786	267,234	709,265	122,236	110,816	26,510	220,213	17,955	497,730	211,535	—1,910	30,528	179,097	—1,232
Southern Pacific Co., Pacific System	6,048‡	5,761,036	2,679,231	8,978,842	938,699	1,031,866	120,971	2,100,168	202,784	4,394,488	4,584,354	—10,671	240,063	4,333,620	1,365,231
Texas & New Orleans.....	458	244,796	89,304	353,286	42,800	56,829	6,937	129,221	8,467	244,254	109,032	843	11,600	98,275	39,055
Vandalia	827	639,379	193,193	919,442	133,816	142,999	25,659	297,463	18,185	618,122	301,320	.....	24,086	277,234	55,445
Wabash	2,515	1,792,570	662,471	2,647,490	279,271	325,666	78,781	922,880	69,276	1,675,874	971,616	—1,788	70,058	899,770	208,138
Wheeling & Lake Erie.....	458	532,037	50,057	619,873	52,720	148,937	7,428	207,493	11,671	428,249	191,624	1,642	23,199	170,067	42,585
FOUR MONTHS OF FISCAL YEAR 1910.															
Atlanta, Birmingham & Atlantic....	641	609,497	180,831	832,169	105,208	128,649	46,287	327,219	34,706	642,069	190,100	.....	32,000	158,100	—5,630
Bangor & Aroostook	530	640,834	257,476	950,551	147,642	116,966	11,400	259,184	40,139	575,332	375,219	.....	6,000	369,219	38,719
Buffalo, Rochester & Pittsburgh.....	567	2,657,566	389,757	3,232,212	412,759	631,689	35,602	811,488	51,312	1,942,850	1,289,362	247	52,000	1,237,609	507,537
Central of Georgia	1,916	2,673,604	1,046,411	4,056,892	584,825	619,415	119,789	1,154,103	158,503	2,636,635	1,420,257	26,252	183,200	1,263,309	187,277
Chicago Great Western R. R.....	1,510*	1,463,706	494,480	2,097,181	239,036	229,985	73,921	780,547	61,738	1,385,227	711,954	76	54,638	657,392	.....
Chicago, Indianapolis & Louisville..	616	1,377,630	549,180	2,094,471	285,278	263,156	54,120	613,362	57,839	1,273,755	820,716	.....	80,500	740,216	185,854
Chicago, Milwaukee & Puget Sound..	1,400†	2,183,700	280,162	2,503,969	82,808	127,051	61,460	674,032	37,122	982,473	1,521,496	14,146	60,000	1,475,642	.....
Chicago, Milwaukee & St. Paul.....	7,511	16,099,660	5,832,542	23,610,688	3,568,391	2,710,690	449,125	8,208,813	364,114	15,301,133	8,309,555	154,597	826,527	7,637,625	—634,644
Denver & Rio Grande.....	2,553	5,787,331	2,297,045	8,438,390	1,073,881	1,195,480	174,687	2,786,269	179,612	5,409,929	3,028,461	45,007	263,000	2,810,468	261,863
El Paso & Southwestern Co.....	867	1,888,689	336,035	2,328,575	302,982	308,884	42,747	627,464	90,616	1,373,693	955,882	—2,487	68,667	884,728	66,701
Elgin, Joliet & Eastern.....	770	2,956,536	132	3,176,268	277,727	563,724	16,598	820,552	50,513	1,729,114	1,447,154	.....	54,000	1,393,154	608,704
Galveston, Harrisburg & San Antonio	1,338	2,452,859	821,230	3,446,570	433,526	493,415	89,996	1,254,330	109,211	2,380,478	1,066,092	—14,696	112,716	938,680	—79,517
Grand Rapids & Indiana.....	591	958,903	723,156	1,794,567	219,497	267,712	44,872	667,495	54,223	1,253,799	540,768	—720	84,235	455,812	—57,345
Houston & Texas Central.....	789	1,497,070	531,607	2,156,981	241,910	207,884	71,446	743,459	75,843	1,340,542	816,439	.....	58,072	758,367	96,950
Lake Erie & Western.....	886	1,465,048	350,226	1,909,890	293,904	312,600	51,070	621,793	39,850	1,319,217	590,673	.....	73,085	517,588	188,835
Long Island	391	1,054,597	2,538,547	3,752,376	355,551	418,860	71,369	1,339,548	70,172	2,255,501	1,496,875	414,775	132,930	1,778,721	383,147
Maine Central	932	1,773,632	1,290,384	3,252,152	516,222	409,233	33,485	994,717	79,271	2,032,928	1,219,223	18,314	135,027	1,102,510	184,351
Michigan Central	1,746	6,322,093	2,755,422	9,953,285	1,406,428	1,221,643	282,341	3,242,482	159,050	6,311,944	3,641,341	—3,970	379,000	3,258,371	742,286
Mobile & Ohio.....	1,114	2,469,460	453,090	3,381,850	407,463	572,624	109 884	1,104,607	120,199	2,314,777	1,067,073	—9,923	89,261	967,889	—38,836
Nashville, Chattanooga & St. Louis..	1,230	2,631,051	931,748	3,790,626	606,373	683,829	141,192	1,272,202	89,201	2,792,797	997,829	—1,624	82,000	914,205	48,008
New York, Chicago & St. Louis.....	558	2,829,177	591,911	3,538,273	356 688	328,309	194,435	1,240,471	51,673	2,171,576	1,366,697	—3,172	132,000	1,231,525	313,614
New York, Ontario & Western.....	546	2,155,587	838,271	3,134,981	474,610	437,676	43,884	1,054,770	66,002	2,076,942	1,058,039	—7,969	66,667	983,404	—82,761
Northern Central	466	3,314,886	791,071	4,329,823	533,028	774,833	54,526	1,780,327	82,507	3,225,221	1,104,602	4,227	98,833	1,009,996	—24,891
Oregon R. R. & Nav. Co.....	1,327	3,383,418	1,801,720	5,476,325	534,148	366,215	123,979	1,471,036	123,311	2,618,689	2,857,636	14,132	168,762	2,703,006	193,073
Oregon Short Line.....	1,508	4,700,336	2,126,672	7,216,038	759,331	526,600	88,562	1,348,090	117,531	2,840,114	4,375,924	17,101	200,000	4,193,025	822,564
Philadelphia & Reading.....	1,024	11,101,547	2,430,178	14,119,793	1,162,384	3,070,331	159,268	3,987,781	232,604	8,612,368	5,507,425	57,674	293,859	5,271,240	368,578
Phila., Balto. & Washington.....	716	3,162,364	2,435,947	6,151,323	908,666	1,037,417	94,533	2,237,192	121,997	4,399,805	1,751,518	.....	143,086	1,608,432	186,414
St. Louis Southwestern.....	773	1,901.195	469,334	2,469,124	264,041	360,125	92,552	539,480	83,323	1,339,521	1,129,603	—2,932	85,302	1,041,369	215,708
St. Louis Southwestern of Texas....	697	886,140	331,089	1,305,036	274,915	276,154	34,574	476,135	59,995	1,121,773	183,263	—670	33,334	149,259	119,296
San Antonio & Aransas Pass.....	727	985,718	365,864	1,422,086	182,904	170,064	18,003	493,811	35,857	900,639	521,447	.....	36,000	485,447	—44,652
San Pedro, Los Angeles & Salt Lake.	1,105	1,498,263	1,162,390	2,828,047	446,681	403,140	110,688	848,936	65,744	1,875,189	952,858	—3,454	107,720	841,684	249,054
Southern Pacific Co., Pacific System	6,048‡	19,696,215	11,405,697	33,146,617	3,450,572	4,073,728	457,360	7,936,898	793,996	16,712,554	16,434,063	64,046	960,250	15,537,359	3,602,237
Texas & New Orleans.....	458	873,561	333,829	1,278,812	172.344	199,578	25,149	462,789	36,822	896,682	382,130	7,112	46,400	342,842	65,882
Vandalia	827	2,155,859	825,606	3,310,456	482.114	554,273	100,496	1,117,752	74,683	2,329,319	981,137	.....	95,501	885,636	126,966
Wabash	2,515	6,546,979	2,786,362	10,055,493	1,182,459	1,315,062	316,591	3,481,041	256,210	6.551,363	3,504,130	—2,767	269,107	3,232,256	423,187
Wheeling & Lake Erie.....	458	2.061,702	230,628	2,471,015	260,079	578,672	29,301	761,731	59,295	1,689,078	781,937	21,795	92,710	711,022	166,088

*Began operations Sept. 1, 1909. Consolidation of Chicago Great Western Ry.; Mason City & Fort Dodge Ry.; Wisconsin, Minnesota & Pacific Ry. †Began operations Aug. 1, 1909. ‡Includes Nevada & California Ry. from July 1, 1909. —Indicates decreases, deficits or losses.

Excursion Rates Not an Undue Discrimination.

Weber Club & Intermountain Fair Association v. Oregon Short Line et al. Opinion by Commissioner Prouty.

The provisions of Section 22 of the act to regulate commerce do not entirely exempt the issuance of excursion tickets from the operation of the undue-discrimination provision but the statute itself authorizes discrimination in permitting the issuance of excursion tickets, and it is only in cases where this privilege has been plainly abused that the commission would be justified in interfering. Defendants make passenger rates of one fare for the round trip in the spring and fall of each year to Salt Lake City, Utah, from surrounding territory in order that persons may visit that city for the Mormon conferences and the Utah State Fair; but it makes a less reduction—to one and one-third the one-way fare—for excursions to the Intermountain Fair held in the fall of each year at Ogden, Utah. Complainants do not attack the reasonableness of the excursion rates to Ogden, but they complain that defendants unduly discriminate against Ogden. The commission is not satisfied that Salt Lake City has been given by these excursion rates a preference of such proportions as to be termed undue. The commission suggests that defendants should establish a uniform passenger rate of 1½ cents per mile each way to all state and county fairs; but this is a matter on which the commission has no authority to make any requirement. (17 I. C. C., 212.)

STATE COMMISSIONS.

A movement has been started by the Kansas Railway commission to get the Interstate Commerce act amended so as to permit employees of state railway commissions to ride on free interstate passes.

H. N. Rockwell, formerly a member of the State Board of Railroad Commissioners of New York, has been appointed accident inspector of the New York Public Service Commission, Second district.

F. M. Larned, of Seattle, Wash., has been appointed secretary of the Washington Railway Commission. He is a graduate of Cornell University and Sunday editor of the Seattle *Post-Intelligencer*. The position of secretary of the commission has been vacant for some time.

The Oklahoma Corporation Commission has ordered a reduction in Pullman sleeping car rates, effective January 1. The berth rate per night is ordered reduced from $2 to $1.50 and seat rates are ordered to be reduced an average of 40 per cent. It is stated that the Pullman Company has agreed to accept the commission's schedule.

The New York Public Service Commission, Second district, has authorized the Glenfield & Western to cease operation from January 10 to April 30, 1910. The road in question runs from Glenfield, on the Rome, Watertown & Ogdensburg division of the New York Central, to Monteola, all in Lewis county. It is essentially a logging road and during the time it is abandoned each year it is almost impossible to operate a railway through that section of the country.

M. H. Hovey has been appointed as expert in signaling and interlocking on the engineering staff which jointly serves the Railroad Commission of Wisconsin and the Wisconsin Tax Commission, reporting to Professor W. D. Pence, who is engineer for the two state commissions. Mr. Hovey was formerly signal engineer of the Illinois Central and lately has been superintendent of construction of the American Railway Signal Company, Cleveland, Ohio, which place he has now resigned. He has also done signal work for the Block Signal and Train Control Board of the Interstate Commerce Commission. After January 1 Mr. Hovey's headquarters will be at Madison, Wis.

The New York Public Service Commission, Second district, has dismissed without prejudice the complaint of the Ryan Elevating & Forwarding Co., of Buffalo, against the New York Central & Hudson River, which asked that the commission order the New York Central to publish a freight tariff to the Bennett elevator, operated by the complainant, to the end that it should be required to supply the Bennett elevator with cars for the carriage of grain at its so-called "at and east rate." It appeared that the Bennett elevator is not situated on the New York Central, but is adjacent to the tracks of the Delaware, Lackawanna & Western and has a switch connection therewith. No proof was submitted that the New York Central was not supplying terminal and elevator facilities sufficient to take care of all ex-lake grain traffic offered it in Buffalo. The commission says that it does not appear that any duty devolves on the New York Central to employ the Bennett elevator in its business as a common carrier.

Secretary Perkins, of the Nebraska Railway Commission, has written a letter to a railway commission of a southern state indicating that the Nebraska Commission is opposed to any amendment of the Interstate Commerce act which would permit the issuance of free interstate transportation to members or employees of state railway commissions. A proposition to amend the law in this respect is being advocated by the members of some railway commissions. Mr. Perkins says that as he understands it the proposed law would leave it discretionary with the railways whether they should issue transportation to the commissioners or not, and that in that case if the commissioners received and accepted transportation they would be placed under direct obligations to the railways. The plan would not be so objectionable if it were made obligatory on the railways, but even in that case the Nebraska Commission would oppose the proposed change because it thinks that any amendment in this direction would be a step toward returning to the old bad condition.

COURT NEWS.

The Arkansas supreme court rendered a decision on December 13 holding the law creating the Railway Commission of Arkansas constitutional. The court held that the commission had power on a proper showing to fix 3 cents a mile as a maximum passenger rate and that the penalties provided by law for violation of an order of the commission are valid.

The indictments found recently in the United States court at Louisville, Ky., for illegal payment of rebates on freight included not only the railway company and the shipper; but, in the case of one road—the Louisville, Henderson & St. Louis—the president of the road also. Somebody connected with the Interstate Commerce Commission says that this is the first time that a railway president has been indicted for violation of the Interstate Commerce law.

The suit of Bradford L. Gilbert, New York, against the Grand Trunk has been settled out of court for $20,000. Mr. Gilbert made plans (*Railroad Gazette*, May 1, 1908, p. 607) for the station and hotel at Ottawa, Ont., at the request of the railway. Later the company engaged other architects to make plans. The company having paid Mr. Gilbert only $31,000, which is less than the usual percentage, he sued for further payment for his work, on the ground that the plans prepared by the other architects were almost duplicates of his.

The Illinois appellate court at Chicago on December 6 rendered a decision holding that the valuation of $50 placed as a maximum on all express packages whose value is not stated by the shipper does not cover all the responsibility of the express company. The company is liable under the Illinois statutes for the full value of goods destroyed through its negligence. Rodman B. Ellison and others of Philadelphia sued the Adams Express Company for $579, alleging that this was the value of two bales of woolens which were destroyed by fire while being transported by the company to Chicago. The company tendered $116.50 in court in satisfaction of all claims against it. The jury in the trial court rendered judgment for this amount. The appellate court in reversing the decision of the lower court said: "The statutes of this state, chapter 27, R. S., makes it unlawful for the carrier to limit its common law liability by any stipulation in the receipt. The limitations in the receipts found in the record are contrary to this statute. The liability of defendant is that cast upon it by the common law to pay the value of the property received for transportation and not delivered."

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

E. B. Peirce, general commerce counsel of the Chicago, Rock Island & Pacific at Chicago, has been appointed general solicitor, with office at Chicago.

George W. Booth, assistant comptroller of the Baltimore & Ohio, has been elected comptroller, with office at Baltimore, Md., succeeding Henry D. Bulkeley, deceased.

Le Roy Kramer, superintendent of the St. Louis & San Francisco at Ft. Smith, Ark., has been appointed assistant to the second vice-president of the Chicago, Rock Island & Pacific at Chicago, succeeding A. E. Sweet, promoted.

G. B. French, whose election as president of the Spokane, Portland & Seattle at Portland, Ore., has been announced in these columns, was born February 12, 1864, at Richmond, Va. He graduated from Princeton University in 1884 and began railway work in 1893 with the Chicago, Milwaukee & St. Paul. From 1897 to 1904 he engaged in other business, and in the latter year returned to the Chicago, Milwaukee & St. Paul. He was made general agent at Kansas City in 1905 and two years later was transferred to Chicago. In 1909 he was appointed general agent and foreign freight agent at Chicago, from which position he resigned when he was elected president of the Spokane, Portland & Seattle, effective December 1.

G. B. French.

B. H. Bail, freight traffic manager of the Philadelphia & Reading, at Philadelphia, Pa., has been elected vice-president and general traffic manager, in charge of freight traffic, including coal and coke, of the Philadelphia & Reading and subsidiary lines, with office at Philadelphia, effective January 1, 1910.

F. M. Carter, treasurer of the Cincinnati, Hamilton & Dayton, at Cincinnati, Ohio, has been elected secretary and treasurer, with office at Cincinnati, succeeding as secretary T. J. Walsh, resigned. E. M. Devereux has been appointed assistant secretary, with office at New York, succeeding David Bosman.

Following is the complete list of officers elected by the board of directors of the St. Louis & San Francisco at New York December 1 and 2: B. F. Yoakum, chairman of the board of directors and of the executive committee; B. L. Winchell, president; C. R. Gray, senior vice-president; James Campbell, vice-president; W. B. Biddle, vice-president (traffic); W. C. Nixon, vice-president and general manager; C. W. Hillard, vice-president; Alexander Douglas, vice-president and general auditor; A. S. Greig, vice-president and general purchasing agent. Messrs. Yoakum and Hillard have their offices in New York; all the rest in St. Louis, Mo.

Operating Officers.

E. A. Goodridge, assistant general manager of the Texas State Railroad at Rusk, Tex., has resigned, and that office is abolished.

The position of general manager of the Panama Railroad has been abolished and J. A. Smith, superintendent at Colon, Panama, is now general superintendent, in charge of the operation of the Panama Railroad and Steamship lines on the Isthmus.

P. C. Hart, general superintendent of the Chicago, Milwaukee & Puget Sound at Butte, Mont., has been transferred to Seattle, Wash.

W. E. Brooks, superintendent of the Missouri Pacific at Nevada, Mo., has been appointed superintendent, with office at Pueblo, Colo., succeeding H. G. Clark, resigned.

F. L. Corwin has been appointed a trainmaster on the Eastern division of the Western Pacific, and J. L. Perry has been appointed chief despatcher, both with office at Elko, Nev.

H. A. Coomer, previously acting superintendent of the New Mexico Central at Santa Fe, N. Mex., has been appointed to the new position of general manager, with office at Santa Fe.

The jurisdiction of R. J. Harlan, superintendent of the Macon division of the Central of Georgia, at Macon, Ga., has been extended over the Chattanooga division, succeeding J. J. Cotter, resigned.

J. T. Nedwideck, trainmaster of the Missouri Pacific at De Soto, Mo., has been appointed superintendent of the Rio Grande Junction, with office at Grand Junction, Colo., succeeding J. H. Brinkerhoff, resigned.

Frederick B. Simmons has been appointed general manager and treasurer of the Marcellus & Otisco Lake Railway, also of the Otisco Lake Navigation Co., succeeding W. P. Barrows, resigned to go into commercial business.

E. B. Mitchell, chief despatcher of the Utah lines of the Denver & Rio Grande at Helper, Utah, has been appointed superintendent of the Green River division, with office at Helper, succeeding O. J. Ogg, transferred.

Richard Doyle has been appointed master of transportation of the Grand Trunk, with office at Durand, Mich., succeeding X. H. Cornell, resigned to become manager of the Michigan Car Service Bureau; J. Ehrke, trainmaster at Durand, Mich., has been appointed assistant superintendent of the 25th and 26th districts (main line) with office at Battle Creek, Mich. O. F. Clark succeeds Mr. Ehrke, with office at Durand, Mich.

The Hine system of organization having been established on the Kansas division of the Union Pacific, the titles of master mechanic, division engineer, traveling engineer, assistant engineer and trainmaster have been abolished, and the following officers will hereafter be designated as assistant superintendent: A. T. Palmer, Joseph Roberts, G. G. Austin, C. C. Jackson, E. J. Boland and R. L. Davis, all with office at Kansas City Mo., and H. E. Richards, with office at Ellis, Kan.

W. T. Tyler, general superintendent of the Second district of the St. Louis & San Francisco, has been appointed general superintendent of the First district, succeeding J. E. Hutchison, and Mr. Hutchison is transferred to the Second district, succeeding Mr. Tyler, both with offices at Springfield, Mo. H. H. Brown, superintendent at Neodesha, Kan., has been transferred to the Central division, with office at Ft. Smith, Ark., succeeding Le Roy Kramer, resigned to accept a position with the Chicago, Rock Island & Pacific at Chicago. S. T. Cantrell, assistant superintendent at Sapulpa, Okla., succeeds Mr. Brown. S. H. Charles, assistant superintendent at Ft. Scott, Kan., has been appointed superintendent of the re-established Red River division, with office at Francis, Okla.

C. W. Jones, general superintendent of the Southwestern district of the Chicago, Rock Island & Pacific at Topeka, Kan., has been appointed general superintendent of the Central district, with office at Davenport, Iowa, succeeding H. S. Cable, resigned. J. B. Smalley, superintendent of the Illinois division at Rock Island, Ill., succeeds Mr. Jones, and H. P. Greenough, superintendent of the Iowa division at Des Moines, Iowa, succeeds Mr. Smalley. A. T. Abbott, superintendent at Colorado Springs, Colo., is transferred to Des Moines, succeeding Mr. Greenough; F. M. Patt, acting superintendent of terminals at Chicago, succeeds Mr. Abbott, and A. B. Ramsdell succeeds Mr. Patt. W. M. Whitenton, general superintendent of the Choctaw district at Little Rock, Ark., has been appointed manager of the Choctaw and Southern districts at El Reno, Okla., succeeding W. S. Tinsman, instead of general superintendent of

the Central district at Davenport, Iowa, as previously stated. T. H. Beacom, superintendent of the Missouri division at Trenton, Mo., succeeds Mr. Whitenton; F. J. Easley, superintendent of the Arkansas division at Little Rock, Ark., succeeds Mr. Beacom; A. B. Copley, superintendent at Haileyville, Okla., succeeds Mr. Easley, and D. Coughlin succeeds Mr. Easley.

Traffic Officers.

G. C. Houser has been appointed a traveling passenger agent of the Grand Rapids & Indiana.

B. H. Helm has been appointed traveling freight agent of the Chicago Great Western, with office at Dallas, Tex.

C. W. Trowbridge has been appointed a contracting agent of the Traders' Despatch, with office at Philadelphia, Pa., succeeding P. M. Diver, resigned.

Charles Patton, traveling freight agent of the Atlanta, Birmingham & Atlantic at Cincinnati, Ohio, has been appointed a traveling freight agent of the Mobile & Ohio, with office at Atlanta, Ga.

J. H. Compton, contracting freight agent of the Chicago, Burlington & Quincy at Kansas City, Mo., has been appointed a traveling freight agent of the Lehigh Valley, with office at Kansas City.

C. W. Mott, general immigration agent of the Northern Pacific, with office at St. Paul, Minn., has resigned. L. J. Bricker, traveling immigration agent at Cincinnati, Ohio, succeeds Mr. Mott.

F. B. Houghton, assistant freight traffic manager of the Atchison, Topeka & Santa Fe at Chicago, has been appointed freight traffic manager, with office at Chicago, succeeding J. E. Gorman, resigned to become vice-president of the Chicago, Rock Island & Pacific. Mr. Houghton was born November 6, 1866, at Gridley, Ill., and began railway work in 1883 as station helper on the Toledo, Peoria & Western. Since 1884 he has been with the Atchison, Topeka & Santa Fe successively as clerk in the office of the passenger agent at Peoria, Ill.; operator and clerk in the Kansas City terminals and other stations in Kansas and New Mexico; freight accountant with the Atlantic & Pacific, part of the Santa Fe system, at Albuquerque, N. Mex.; freight accountant at Topeka, Kan.; rate clerk and chief clerk in the office of the freight traffic manager at Chicago; division freight and passenger agent at El Paso, Tex. In October, 1901, he was made assistant general freight agent at San Francisco, Cal., and in 1905 was made assistant freight traffic manager, with office at Chicago, from which position he has just been promoted.

F. B Houghton.

L. E. Stanton, contracting freight agent of the Chicago, Milwaukee & St. Paul, at San Francisco, Cal., has been appointed general agent, with office at San Francisco, succeeding C. L. Canfield, deceased.

George H. Lee, general passenger agent of the Chicago, Rock Island & Pacific, in charge of the Choctaw district, at Little Rock, Ark., has been transferred to St. Louis, Mo., where he will have jurisdiction also over the St. Louis, Kansas City & Colorado.

Stanton Curtis has been appointed northwestern passenger agent of the Southern, with office at Chicago, succeeding J. S. McCullough, resigned. W. T. Williford has been appointed a traveling freight agent at Macon, Ga., succeeding E. H. Langston.

William J. Leahy, whose appointment as general passenger agent of the Chicago, Rock Island & Pacific was announced in the *Railroad Age Gazette*, December 10, page 1170, was born July 25, 1867, at Elmira, N. Y. He was educated in the public schools and at St. Joseph College, Buffalo, N. Y. He began railway work in 1883 as clerk in the office of the auditor of the Buffalo, New York & Philadelphia, now a part of the Pennsylvania Railroad. From 1884 he was consecutively clerk in the passenger department and later ticket agent of the West Shore; traveling passenger agent at New York, passenger agent for the Middle district at Philadelphia, and then general eastern passenger agent at New York of the Chicago, Rock Island & Pacific. In April, 1901, he was made assistant general passenger agent of the Rock Island and the St. Louis, Kansas City & Colorado, a part of the Rock Island system, at St. Louis. Since October, 1905, he has been first assistant general passenger agent of these roads at Chicago, from which position he has just been promoted to general passenger agent, succeeding L. M. Allen, promoted.

William J. Leahy.

F. E. Signer, general freight agent of the Minneapolis, St. Paul & Sault Ste. Marie, with office at Chicago, has resigned to become Commissioner of the Association of Lake Lines, with office at Buffalo, N. Y.

J. F. Auch, assistant freight traffic manager of the Philadelphia & Reading and subsidiary companies at Philadelphia, Pa., has been appointed freight traffic manager, with office at Philadelphia, succeeding B. H. Bail, elected vice-president, effective January 1, 1910.

G. S. Pentecost, division passenger agent of the Chicago, Rock Island & Pacific at Omaha, Neb., has been appointed assistant general passenger agent, with office at Kansas City, Mo., succeeding J. A. Stewart, promoted. J. S. McNally, division passenger agent at Oklahoma City, Okla., succeeds Mr. Pentecost.

Engineering and Rolling Stock Officers.

N. M. Maine, general master mechanic of the Chicago, Milwaukee & Puget Sound at Deer Lodge, Mont., has been transferred to Tacoma, Wash.

Byron E. Woodcock has been appointed chief engineer of the East Broad Top Railroad & Coal Co., with office at Orbisonia, Pa., succeeding A. E. Bachert.

G. E. Johnson, master mechanic of the Chicago, Burlington & Quincy at Wymore, Neb., has been appointed general master mechanic, with office at Lincoln, Neb.

Michael W. Hassett has been appointed master mechanic of the New York Central & Hudson River, with office at East Buffalo, N. Y., succeeding F. M. Steele, transferred to Rochester, N. Y.

R. F. Kilpatrick, assistant superintendent of motive power and car department of the Denver & Rio Grande at Denver, Col., has been appointed master mechanic of the Western Pacific, with office at Stockton, Cal.

M. H. Haig, whose appointment as mechanical engineer of the Atchison, Topeka & Santa Fe, with office at Topeka, Kan., has been announced in these columns, graduated from Cornell University in 1900 and immediately after graduating began railway work with the Illinois Central as a machinist apprentice. He was later a machinist and afterwards a general foreman. He resigned in April, 1906, to become editor of the *Railway Master Mechanic*. In February, 1909, he was appointed betterment assistant on the Santa Fe, where he was engaged in the betterment work of the bonus department. He was promoted from this position to the office of mechanical engineer.

Purchasing Officers.

John U. Mock has been appointed assistant treasurer and purchasing agent of the Denver, Laramie & Northwestern, with office at Denver, Colo., succeeding J. L. Terry, resigned to go to another company.

H. E. Rouse, whose appointment as general storekeeper of the Chicago Great Western has been announced in these columns, was born August 7, 1868, at Morning View, Ky. He began railway work in March, 1887, with the Cincinnati, New Orleans & Texas Pacific as clerk in the office of the superintendent of motive power and machinery. Later in the same year he was transferred to the accounting department, where he remained six years. He was made chief clerk to the master mechanic and division storekeeper at Chattanooga, Tenn., in September, 1893. In February, 1900, he went with the Chicago & Alton, where he was consecutively until his recent appointment, chief clerk and accountant for the maintenance of way department, chief clerk and accountant for the motive power department, and general storekeeper, with office at Bloomington, Ill. Mr. Rouse's headquarters will be at Oelwein, Iowa, instead of Chicago, as previously stated.

H. E. Rouse.

OBITUARY.

Ira F. Randolph, formerly traveling passenger agent of the Illinois Central, died recently in Plainfield, N. J.

H. C. Reese, assistant general freight agent of the Galveston, Harrisburg & San Antonio, the Houston & Texas Central, the Houston East & West Texas and the Houston & Shreveport, with office at Houston, Tex., died at Houston on December 6. Mr. Reese was born November 14, 1859, at New Orleans, La. He began railway work in 1874 with the Illinois Central in New Orleans as an office boy. He went with the Chicago, St. Louis & New Orleans, now a part of the Illinois Central, in 1878 as stenographer and ticket stock clerk, and four years later he became assistant ticket agent of the Texas & Pacific. He was afterwards stenographer to the division superintendent and then to the assistant general freight agent, and was made commercial agent in 1887. In 1892 he was made general agent of the Great Northern at St. Louis, and the next year went with the Mexican National at New Orleans as commercial agent. He was made commercial agent of the Southern Pacific at Houston, Tex., in 1894, which position he held five years, and in March, 1899, he was appointed assistant general freight agent. He was appointed to a similar position on the Houston & Texas Central in December, 1901, and in October, 1906, his jurisdiction was extended over the Galveston, Harrisburg & San Antonio, the Houston East & West Texas and the Houston & Shreveport.

Railroad Construction.

New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—According to press reports this company has organized auxiliary companies to build about 450 miles in western Texas. This is in addition to the Texico-Coleman cut-off, which is to be 310 miles. The Santa Fe is said to have taken over the rights and franchises of the Concho, San Saba & Llano Valley, which recently amended its charter, permitting it to build from San Angelo north to the Texico-Coleman cut-off in Lubbock county, 218 miles. Permission is also granted to build from San Angelo south to a point on the San Saba river, 26 miles, as well as from Miles to Llano, about 135 miles. The line is already in operation from Miles east to Paintrock, 16.5 miles. The Santa Fe is said to have let a contract to build from Lometa to Brady, about 70 miles. (Oct. 15, p. 725.)

The Plainview branch of the Pecos & Northern Texas has been extended from Plainview, Tex., southward to Lubbock, 47 miles. (Oct. 8, p. 662.)

Atlantic Coast Line.—The Boone Valley branch of the Jacksonville district has been extended from Tiger bay, Fla., to Fort Meade, 3.5 miles. (June 25, p. 1545.)

Baltimore & Ohio.—Surveys are said to be under way to secure right-of-way for the construction of a third track from Pittsburgh, Pa., northwest to New Castle.

Bartlett-Florence.—This road has been opened for traffic from Bartlett, Tex., to Schwertner, 5.4 miles. The company now has under construction about 84 miles to complete a line from Lampasas, southeast to Milano, with a branch from a point on the main line near the eastern end southeast to Rockdale. G. W. Hubbard, president, Bartlett.

Bennettsville & Cheraw.—This road has been extended from Drake, S. C., southward to Brownville, seven miles. (April 16, p. 871.)

Brooklyn Rapid Transit.—An officer writes that the company is now at work in the Borough of Brooklyn laying a double-track line on Nostrand avenue, south from Flatbush avenue to Avenue U, aggregating about 12,025 ft. of single track. It is probable that some of the work will be delayed until next year.

Buffalo & Susquehanna.—This company is said to be making financial arrangements for carrying out improvements to include additional passing tracks and increased shop facilities. Important betterments have been made this year. A large number of ties were laid, about 80 miles of track reballasted and cuts and fills have been widened. (Nov. 26, p. 1036.)

Contract is said to have been given to Frank Greco, of Galeton, Pa., to build 20 miles of line from Keating Summit, Pa., west to Potato creek, on which grading is to be started at once. Contracts said to be let to J. S. Brady, of Corning, N. Y., for the masonry and wooden trestle work, and to the American Bridge Co. for the steel bridges.

Canadian Pacific.—The Wynyard section of the Central division has been extended from Wynyard, Sask., westward to a junction with the Lanigan and Last Mountain sections, at Lanigan, 37 miles. (Oct. 8, p. 660.)

Caney, Piedmont & Morehead.—This company has projected an extension from Piedmont, Morgan county, Ky., for 30 miles. S. J. Gish, secretary, treasurer and general manager, New Pikeville, Ky.

Central Ontario.—An officer writes that an extension has been located from Lake St. Peter, Ont., north to Whitney, 17 miles. This work was suspended in the early part of 1909, and it is expected will be resumed next year.

Chicago, Burlington & Quincy.—An officer writes that no definite arrangements have yet been made for an extension from Sidney, Iowa, southeast to Riverton. (Dec. 10, p. 1167.)

Chicago, St. Paul, Minneapolis & Omaha.—Work is now under way by the Winston Brothers Co., of Minneapolis, Minn., on 4.93 miles from Kennedy, Wis., east.

COLVILLE LOGGING RAILWAY.—Incorporation has been asked for in the state of Washington to build a logging line about 15 miles long from Orin, Wash., to Bear Creek. C. T. Winslow, of Colville, Wash.; B. F. Pierce, of Orin, and J. E. Morgan, of Oshkosh, Wis., are interested.

CONCHO-COLORADO.—According to press reports from Colorado, Tex., plans are being made by residents of that place, also of Snyder, Robert Lee and Sweetwater, to build from Colorado southeast to Robert Lee, in Coke county, about 50 miles.

CONCHO, SAN SABA & LLANO VALLEY.—See Atchison, Topeka & Santa Fe.

CONTROLLER RAILWAY & NAVIGATION CO.—Incorporated in New Jersey, with $300,000 capital, to build from a point on Controller bay, Alaska, northeasterly to the Carbon mountains. A branch is also to be built northwesterly to Mount Hamilton. The company is authorized to build docks and operate ocean and river steamships. The incorporators include: J. R. Turner, H. O. Coughlan, S. A. Anderson, J. W. Stout and C. B. Leggett, with address at 15 Exchange place, Jersey City, N. J.

COPPER RIVER & NORTH WESTERN.—An officer writes that the Katalla Co., of Cordova, Alaska, is now at work from Tiekel river to Bonanza mine, 94 miles. Surveys made for a further extension of 58 miles. (See Copper River, Dec. 3, p. 1107.)

DELAWARE & EASTERN.—Contract is said to have been given for building a 32-mile section from Grand Gorge, N. Y., to Middleburg, on which work is to be started at once. Contracts for building 15 miles from Hancock to East Branch, as well as for 18 miles from Margaretville to Grand Gorge, 32 miles from Middleburg to Schenectady, and a five-mile extension to Rotterdam Junction, are to be let soon. Funds for financing this work have been secured through a recent bond issue. When this work is finished the line will be 154 miles long from Hancock, N. Y., where connection is to be made with the Erie, northeast to a connection with the Delaware & Hudson and the West Shore at Schenectady, and to a connection with the Boston & Maine and the West Shore at Rotterdam Junction. The road is now in operation from East Branch, on the Ontario & Western, to Arkville, on the Ulster & Delaware, 37.52 miles. (Nov. 12, p. 943.)

DURHAM & CHARLOTTE.—An officer writes that this company is building with its own men an extension of 10 miles from Cummock, N. C., southeast to Sanford. Work was finished recently on a steel bridge over Deep river at Cummock.

EAST BROAD TOP RAILROAD & COAL CO.—The Shade Gap branch has been extended from Shade Gap, Pa., to Neeleyton, four miles.

ENID, OCHILTREE & WESTERN.—An officer writes that work is under way by the Pan Handle Construction Co., of Dalhart, Tex., from Dalhart east to Ochiltree, 112 miles. Surveys have been made from Ochiltree east for an extension to Enid, Okla., 176 miles. W. R. Allen, chief engineer, Dalhart. (Oct. 22, p. 777.)

GRAND RIVER VALLEY.—See Michigan Central.

GRAND TRUNK PACIFIC.—Contract is said to have been given to Phelan & Shirley, of Omaha, Neb., for work to cost about $1,500,000. This calls for constructing about 100 miles of line between Edmonton, Alb., and Prince Rupert, B. C.

GRAYS HARBOR & PUGET SOUND.—See Union Pacific.

GREAT NORTHERN.—The Waterville line of the Spokane division has been opened for business from Columbia river northeastward to Mansfield, Wash., 60.4 miles. (Nov. 19, p. 990.)

HUMBOLDT & EASTERN.—An officer writes that preliminary surveys have been made from Humboldt bay, Cal., to the Sacramento valley, about 175 miles. The line was projected by residents of Humboldt county to secure an outlet for products from that section through heavy timber lands. It may be necessary to build 20 or 40 miles paralleling the Southern Pacific to secure connections with other lines, and it is probable that an extension will be built north to the copper districts of Shasta county. E. E. Skinner, secretary, Eureka. (Sept. 17, p. 520.)

INTER CITY VIADUCT FREIGHT.—Incorporated in Missouri to operate a line connecting Jefferson City, Mo., with Kansas City, Kan. J. W. Reinhart is said to be president.

INTERCOLONIAL.—This company during 1909 completed second track between Moncton, N. B., and Painsec junction, 7.25 miles; work is now under way by Whitehead Brothers, of Grand Falls, from Harmony, on Prince Edward island, to Elmira, 10 miles; surveys under way for a diversion of line at Chatham, N. B.; a branch to the wharves, 8.5 miles, and for a freight cut-off from a point east of Moncton to the new transportation yard, 1.5 miles, as well as for a diversion of line from George's river to Leitches creek, 13.5 miles.

IOWA CITY, OTTUMWA & SOUTHEASTERN (ELECTRIC).—Incorporated in South Dakota, with $2,500,000 capital and offices at Pierre, S. Dak., and Iowa City, Iowa. The plans call for a line from Iowa City southwest to Ottumwa, 80 miles. The incorporators are S. J. Smith, R. Wilson and F. Farmer, of Iowa City, and G. P. Peterson, of Pierre, S. Dak.

KANSAS CITY, MEXICO & ORIENT.—An officer writes that work is now under way by Roach & Stansell, of Memphis, Tenn., and G. Webb, of Chihuahua, Mex., on 28 miles, from San Angelo, Tex., south to Mertzen, and from Sanchez west towards Chihuahua. (Nov. 19, p. 991.)

KENTUCKY ROADS.—Plans are said to be under way by capitalists of Indianapolis, Ind., to build a line from Columbia, in Adair county, Ky., northwest to Greensburg, in Green county, about 18 miles. The town of Columbia is said to have agreed to contribute $75,000 towards the cost of the work.

LAKE ERIE & PITTSBURGH.—See Lake Shore & Michigan Southern.

LAKE SHORE & MICHIGAN SOUTHERN.—An officer of the Lake Erie & Pittsburgh writes that work is about finished from Mile creek junction, near Cleveland, Ohio, southeast to the Cleveland & Pittsburgh connection near Ravenna, 27 miles.

LIBERTY-WHITE.—An officer writes that an extension is projected from Holmesville, Miss., southeast to Tylertown, 12 miles.

MEXICAN LIGHT & POWER CO.—The line which this company built from Beristain, Puebla, north to Necaxa, Puebla, in connection with its large power plant at Necaxa, is soon to be opened for public traffic. The line will be improved and an extension built northeast to Xicoltepec. F. S. Pearson, of the Mexico Northwestern, is interested.

MEXICAN ROADS.—The San Juan Mining Co., of Mapimi, Durango, will build a 15-mile line from Mapimi to a connection with the National Railways of Mexico, at Bermejillo. Material has been bought and work will be started in January. A narrow gage line, owned by the Penoles Mining Co., is now in operation between these two places.

MICHIGAN CENTRAL.—An officer writes that $1,500,000 is to be used for double-tracking the Grand River Valley between Jackson, Mich., and Grand Rapids, 94.5 miles, adding more tunnels and making other improvements. The work will probably be carried out next year.

MIDLAND PACIFIC.—See St. Louis Manufacturers' Railway.

MILWAUKEE-WESTERN (ELECTRIC).—A certificate of public convenience and necessity has been granted by the Wisconsin Railway Commission to build from Milwaukee, Wis., northwesterly to Beaver Dam, 56 miles, with a branch from Sussex via Pewaukee to Waukesha, nine miles. Contract has been let to the W. D. Chapman Co., of Chicago. A power station is to be put up at Hustisford. As soon as the above lines are built a line is to be constructed from Beaver Dam north to Fox lake. V. Zimmerman, Jr., president, Mitchell Street Bank, Milwaukee. (July 16, p. 125.)

MISSISSIPPI ROADS.—According to press reports plans are being made to build from Poplarville, Miss., northwesterly towards Columbia, about 20 or 30 miles. The Sage Land & Development Co. will build the line. Martin Van Heuvert, of Mobile, Ala., may be addressed.

NEW YORK CENTRAL & HUDSON RIVER.—This company has submitted to the New York Public Service Commission a list

of the improvements yet to be made, to cost $20,377,900, as follows: Electrification of lines, station improvements, etc., in the Borough of Manhattan, New York City, and vicinity, $13,920,400; grade crossing eliminations in Buffalo, N. Y., $674,400; Utica, $220,000; Newburgh, $125,000; new passenger station at Rochester, $750,000; Ravena, $45,000; Watertown, $258,500; site for passenger station at Buffalo, $100,000; electrification of West Shore from Utica to Syracuse, $112,900; double-tracking and grade revisions from Syracuse to Buffalo, $1,580,200; Watertown junction to Richland, $582,000; Utica to Stittville, $144,700; automatic signals to shorten blocks, Croton to Buffalo, $680,000; motive power facilities and improvements, $623,200; signals, $561,600.

During 1909 the New York Central & Hudson River finished work on 60 miles of second track as follows: Utica, N. Y., to Stittville, on the Black river line of the Rome, Watertown & Ogdensburg division, 10 miles; between Watertown and Richland, 17 miles; on the Western division of the West Shore, 23 miles; between Rochester and Suspension bridge, seven miles; and three miles on the Pennsylvania division.

New York, New Haven & Hartford.—An officer writes that the company has authorized the letting of contracts for double-tracking the Berkshire division from Hawleyville, Conn., southeast to Shelton, about 20 miles.

A director of the company is quoted as saying that the New York, Westchester & Boston is to build to Danbury, Conn., and Brewster, N. Y. The N. Y., W. & B. is at present under construction from 177th street, New York, northeastward to Mount Vernon (four-track), thence eastward to Port Chester and northward to White Plains. According to the same informant, the N. Y., W. & B. will connect with the Harlem river branch of the New Haven road at some point near New Rochelle, which would seem to indicate a line from Mount Vernon southeastward to Pelham Manor or Bartow. The line from Mount Vernon to White Plains is to be double-track, and the present report indicates that thence to Danbury a single-track line will be built. The distance from White Plains to Danbury is about 30 miles. A line from Mount Vernon to Danbury, as indicated, will shorten the distance by the New Haven between New York and Pittsfield about 14 miles. (Nov. 5, p. 896.)

According to press reports work is to be resumed double-tracking between Bristol, Conn., and Waterbury. The improvements include tunneling the mountain near Terryville. This work is now under way; the bore has been driven 1,680 ft. from the eastern portal, about one-half of the entire distance. It is expected to have the work finished by July, and the tunnel in operation by September, 1910.

New York, Westchester & Boston.—See New York, New Haven & Hartford.

Northwestern Pacific.—Construction work has been resumed and it is expected that a connecting link of 100 miles will be finished during 1910. This line is to connect the northern lines, aggregating about 75 miles, from a point south of Shivly, Cal., south to the Southern division, which extends north from San Francisco bay to Willets. (Nov. 19, p. 991.)

Ohio River & Western.—An officer writes that an extension is projected from Powhatan point, Ohio, west to Cumberland, 44 miles.

Pacific Electric.—This company during 1909 built 11 miles of line between Huntington Beach, Cal., and Delhi, and various extensions, aggregating 10.50 miles.

Paris & Mt. Pleasant.—According to press reports a contract has been given to M. Tansey, of Shreveport, La., for grading this line. The projected route is from Paris, Tex., southeast to Mt. Pleasant, 50 miles. Right-of-way has been secured from Paris to Sulphur. R. F. Scott, president, Paris; H. A. Willson, vice-president. (July 23, p. 169.)

Pe Ell & Columbia River.—Incorporated in Washington, with $50,000 capital and office at Pe Ell. The plans call for a line from Pe Ell, Wash., which is on the Northern Pacific, south to the Columbia river, near Cathlamet, 35 miles. The incorporators include: W. C. Yeomans and C. L. Yeomans, of Pe Ell; C. A. Doty, of Doty, and F. B. Hubbard, of Centralia.

Pennsylvania.—Passenger service has been established on the Yukon branch of the Pittsburgh division from Hunker, Pa., to Wyano, eight miles.

Pittsburgh, Shawmut & Northern.—An officer writes that work is under way building from Knoxdale, Pa., southwest to Freeport, 63.03 miles. Contract let to J. J. Corbett, of Kittanning, for some of the work. Twenty-five miles of the line is to be built by the company's men. (Oct. 8, p. 662.)

Quanah, Acme & Pacific.—Train service has been extended from Acme, Tex., westward to Paducah, 37.5 miles.

Sacramento & Sierra.—An officer writes that contracts are to be let during the spring of 1910 to build from Sacramento, Cal., at the Sacramento river, northeast to timberlands in Eldorado county, near Lake Tahoe, about 80 miles. Surveys are now being made. C. A. Smith, president, and J. M. Graham, chief engineer, Sacramento.

St. Louis & San Francisco.—An officer writes that work is now under way by H. Dalhoff, of Little Rock, Ark., from Marion, Ark., to Hulbert, 5.49 miles. (Sept. 17, p. 521.)

St. Louis Manufacturers' Railway.—This company, which was organized to build a belt line around East St. Louis, Ill., and a $3,000,000 passenger and freight terminal in South St. Louis, on which considerable work has already been done, is said to be back of a project to build a new line into St. Louis from the southwest. The plan calls for a line to be known as the Midland Pacific, from St. Louis southwest through the Ozark region, to Fort Smith, Ark. G. F. Moore, president and general manager of the St. Louis Manufacturers' Railway, is said to be back of the project.

Sumpter & Choctaw.—An officer writes that surveys are being made for an extension from Bellamy, Ala., north to Hixon, nine miles.

Tacoma Eastern.—An officer writes that work is now under way from Glenavon, Wash., to Morton, nine miles.

Tampa & Jacksonville.—An extension of this road is to be built southerly from Fairfield, Fla., southwest to Dunnellon, 30 miles.

Tum Tum Mountain Railway of Vancouver (Electric).—According to press reports work is to be started this month on the first four miles of this projected line. The company was organized to build from Ridgefield, Wash., northeast to Tum Tum mountain, 45 miles. A. Arnston, Vancouver, is general agent. (Oct. 1, p. 614.)

Union Pacific.—According to press reports from Hoquiam, Wash., the Gray's Harbor & Puget Sound will have to be rebuilt from Rochester, Wash., west to Cosmopolis. This work is to be carried out at once to repair the damage caused by high water. The loss is estimated at $250,000. (Oct. 29, p. 827.)

The North Platte branch of the Wyoming division has been extended from Oshkosh, Neb., west to Northport, 43.3 miles.

Virginia & Southwestern.—An officer writes that work is now under way by Lane Brothers & Jones, of Altavista, Va., on 37.42 miles, between Mocassin Gap, Va., and Persia Junction, Tenn., of which 6.04 miles are in Virginia and 31.38 miles are in Tennessee.

Wasioto & Black Mountain.—This company is building from Wasioto, Ky., on the Louisville & Nashville, up the Cumberland river for about 12 miles. Contracts were recently let to the Callioson Construction Co. and the Gibson-Carr Co. for building seven miles up Yellow Creek to connect with the Wasioto & Black Diamond Railway, near Wasioto. J. T. Asher, president; A. B. Gloster, chief engineer, Middlesboro.

Webber Falls, Shawnee & Western.—Organized in Oklahoma with $500,000 capital to build from Webber Falls, Okla., west through Muskogee county, to Warner, then southwest through McIntosh, Okmulgee, Okfuskee, Lincoln and Pottowatomie counties, to Shawnee, about 120 miles. Two routes are under consideration. An extension is also projected from Shawnee, southwest via Purcell, to Lawton, 110 miles. The incorporators include A. R. Peyinghaus, of Muskogee; J. B. Crouch; J. F. Sparrow, of Porum; S. L. Hayes, of Webber Falls, and C. Russell, of Warner.

Railroad Financial News.

CAROLINA, CLINCHFIELD & OHIO.—A charter under the name of the Carolina, Clinchfield & Ohio Railroad Co., of South Carolina, has been accepted by the secretary of state of South Carolina. This ends a long-standing dispute as to the right of the C., C. & O. to incorporate as a domestic corporation under the laws of the state.

CHICAGO & MILWAUKEE ELECTRIC.—It is understood that this road will be taken out of the hands of the receivers some time in January and placed under new management.

CHICAGO, MILWAUKEE & ST. PAUL.—The company has sold to the National City Bank and to Kuhn, Loeb & Co., both of New York, $25,000,000 general mortgage 4 per cent. bonds. The proceeds of the sale are to be used principally for the retirement of maturing bonds. The company had outstanding October 30 the following amounts of bonds maturing January 1, 1910: Southern Minnesota division first mortgage 6 per cent. bonds of 1880, $7,432,000; Hastings & Dakota division first mortgage 5 and 7 per cent. bonds of 1880, $6,670,000; Chicago & Pacific division first mortgage 6 per cent. bonds of 1880, $3,000,000. There were outstanding $2,840,000 Mineral Point division first mortgage 5 per cent. bonds of 1880 which matured July 1, 1910, and $2,155,000 Milwaukee & Northern first mortgage Schwartz to Green Bay 6 per cent. bonds of 1880 which matured June 1, 1910. The total maturing up to July, 1910, being $22,097,000.

CHICAGO, PEORIA & ST. LOUIS RAILROAD.—This company was incorporated under the laws of Illinois December 6 with an authorized capital stock of $4,000,000. It is to be the successor company to the Chicago, Peoria & St. Louis Railway, which is to be sold under foreclosure. (Aug. 6, p. 259.)

COLORADO & SOUTHERN.—On December 9 a dividend of 2 per cent. payable December 31 was declared on the outstanding $31,000,000 common stock. In November, 1908, an initial dividend of 2 per cent. was declared, and at that time it was commonly supposed that the dividend was a semi-annual one and that the annual rate would be 4 per cent. After a controlling interest in the common stock had been bought by the Chicago, Burlington & Quincy, President Harris was quoted as saying that the common stock was a 2 per cent. stock.

KANAWHA & MICHIGAN.—The minority stockholders' committee, G. D. Mackay, chairman, have issued a circular addressed to the representatives of the majority stock, of which the following is an abstract:

It is now ten years since the Hocking Valley came into control of the Kanawha & Michigan. During that time improvements have added greatly to the value of the property; they have cost about $7,000,000, of which approximately $4,000,000 has been added to the debt and $3,000,000 expended out of earnings. Gross earnings during that period have been over $16,000,000, having increased from $700,000 to about $2,400,000 per year. An average of over 1,000,000 tons per annum has been contributed to the Toledo & Ohio Central and the Hocking Valley system, and it is perhaps safe to say that the earnings of the Hocking Valley have been augmented by these improvements to the amount of $6,000,000 during the last ten years. This advantage has come to one-half of the shareholders of the Kanawha & Michigan Co., but the other half (the minority) has received nothing.

An agreement entered into three years ago to exchange each 100 shares of Kanawha & Michigan stock for 60 shares of Hocking Valley has been estopped by order of the court. Dividends meanwhile have been paid on the Hocking Valley stock to the amount of 12 per cent., and the 60 per cent. of this 12 per cent. which should have come to the Kanawha & Michigan minority stockholders—or over 7 per cent. on their holdings—has been withheld from them by the above legal action, so that they have suffered a loss of 7 per cent. in dividends during the past three years. Now that the merger is in suspense and the earnings of the Kanawha & Michigan are showing approximately $50,000 per month for the stockholders—equal to 7 per cent. per annum on the stock—we respectfully ask you to state what offer you are prepared to make of a settlement of the 7 per cent. dividend agreed upon during the three years since we consented to a merger, and what promise of dividends you will offer to us from the present large earnings.

MEXICAN SOUTHERN.—On December 6 the directors met in London to ratify the lease of the property of the Mexican Southern to the Interoceanic of Mexico, which itself is being operated by the National Railways of Mexico.

NEW ORLEANS, MOBILE & CHICAGO.—Stockholders have voted to approve a mortgage to secure $35,000,000 bonds. (May 28, p. 1146.)

NEW YORK CENTRAL & HUDSON RIVER.—Of the proceeds of the sale of $44,658,000 new stock, $21,966,615 is to be applied toward the retirement of $25,000,000 5 per cent. three-year notes due February 1, 1910. The remainder is to be spent for improvements and additions, as noted under Railroad Construction.

NEW YORK, NEW HAVEN & HARTFORD.—This company has borrowed from the New York Trust Co. $5,000,000 on nine months' notes bearing 4 per cent. interest. The money is to be used for current development work, and the notes will be paid at maturity from the cash coming in through the payment of instalments on the stock recently sold. The rate of interest is unusually low for short-term notes.

OCEAN SHORE (ELECTRIC).—F. S. Stratton has been appointed receiver of this electric road, under construction from San Francisco to Santa Cruz. Of the total, 38 miles at the San Francisco end and 14 at the Santa Cruz end are completed, leaving 26½ miles uncompleted. The appointment, which was made by the United States Circuit Court, followed the application for a receiver by the Baldwin Locomotive Works.

ST. LOUIS & SAN FRANCISCO.—It is reported that if the sale, the possibility of which was mentioned in these columns last week, of the control of the St. Louis, Brownsville & Mexico to the St. Louis & San Francisco goes through, the Frisco will guarantee a new issue of Brownsville company bonds. The new bonds, it is said, will be issued to retire $3,000,000 existing bonds and $3,000,000 authorized notes, of which $1,600,000 are understood to be outstanding.

ST. LOUIS, BROWNSVILLE & MEXICO.—See St. Louis & San Francisco.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—Stockholders are to vote February 2, 1910, on the question of buying the property, assets and franchises, or any part of them, of the following companies: Arkansas & Louisiana; Arkansas Midland; Arkansas Southwestern; the Brinkley, Helena & Indian Bay; Coal Belt Railway Co.; Eldorado & Bastrop; Farmerville & Southern; Garland Western; Gurdon & Fort Smith; Gurdon & Fort Smith Northern; Herrin Railway; Herrin & Johnson City; Kansas & Arkansas Valley; Little Rock & Hot Springs Western; the Little Rock & Monroe; Little Rock Junction; Mississippi River, Hamburg & Western; Natchez & Western; New Orleans & Northwestern; Pine Bluff & Western; Springfield Southwestern; St. Louis, Watkins & Gulf and Wabash Southern.

Stockholders are also to vote on the question of authorizing an increase of $60,000,000 in the capital stock. This increase would bring the total capital stock authorized up to $190,000,000. A vote will also be taken on the question of issuing $25,000,000 additional mortgage bonds. (See Nov. 26, p. 1040.)

ST. LOUIS SOUTHWESTERN.—The company has sold to J. H. Watkins, New York, $725,000 5 per cent. equipment notes.

TAMPA & JACKSONVILLE.—The company has authorized an issue of first mortgage 5 per cent. bonds of 1909-1949 limited to $10,000 per mile, with the privilege of issuing $2,000 per mile additional bonds to pay for improvements after the company has earned twice its interest charges for two years in succession. The road runs from Sampson City, Fla., on the main line of the Georgia, Southern & Florida, southerly to Fairfield, 49 miles. The directors are: J. B. Munson, B. W. Blount, F. J. Lisman, A. de Sola Mendes, F. M. Simonton and A. P. Stuckey.

Late News.

The items in this column were received after the classified departments were closed.

The two bills of Mr. Esch, of Wisconsin, mentioned in General News, have both been passed by the House of Representatives.

A. P. Cone, superintendent of the Richmond division of the Southern Railway, was killed in the wreck that occurred on the Southern Railway in North Carolina December 15.

The Jefferson & Northwestern, operating a logging line from Jefferson, in Marion county, Tex., for about 20 miles into Cass county, is planning to build an extension northwest to Naples, or to Clarksville, in Red river county.

The directors of the Reading Company have declared a semi-annual dividend of 3 per cent. on the common stock. This places the stock on a 6 per cent. annual basis, as compared with a 4 per cent. rate paid since 1905.

The directors of the Lehigh Valley have declared a semi-annual dividend of 3 per cent. on the common stock. Heretofore the rate has been 2 per cent. paid regularly semi-annually since 1904, and 1 per cent. extra paid semi-annually since 1906.

The Railroad Promotion & Construction Co. has been organized in Iowa, with $25,000 capital, to construct a number of interurban lines into Des Moines, Iowa. H. H. Polk, president; William Moran, vice-president; C. H. Philpott, secretary, and O. P. Herrick, treasurer.

According to press reports the Mount Hood Railroad is making plans to build an extension about 75 miles long through an agricultural and timber section, south of Hood river valley, Oregon. Connection is to be made with the Oregon Trunk, now building from the Columbia river south.

The directors of the Standard Coupler Co., New York, have declared the regular semi-annual dividend of 4 per cent. on the preferred stock and also a dividend of 1 per cent. on the common. This is the first dividend declared on the common stock since December, 1907, when 2½ per cent. was paid.

The final report of the department of agriculture for the 1909 crops gives the winter wheat crop as 446,366,000 bushels, comparing with 437,908,000 bushels, the final figure for 1908. The spring wheat crop is given as 290,823,000, comparing with 226,694,000 bushels in 1908. The corn crop in 1909 is 2,772,376,000, comparing with 2,668,651,000 bushels in 1908.

The United States Steel Corporation, following the published resolutions of the labor unions opposing the open shop policy of the corporation, has issued a statement in which it plainly states the two reasons in mind when it was suggested that the employees purchase stock. First to make them faithful employees through their having a stock interest, and second, to insure the friendship and assistance of these employees in just such a movement as is now on foot.

According to press reports surveys are being made for the line from Beloit, Kan., northwest to Ionia, in Jewell county, thence through the northeastern part of Smith county, into Franklin county, Neb., where the Republican river will probably be crossed at Franklin, continuing north through Hildreth and through Kearney county to the Platte river, thence to Kearney, in Buffalo county, about 120 miles. W. H. Mitchell, president, Beloit; N. R. Holmes, vice-president, Troy, N. Y.; B. L. Brown, chief engineer, St. Louis, Mo.

The Brooklyn Rapid Transit Company, operating the surface and elevated street railways in Brooklyn, N. Y., announces that pensions are to be paid by the company to its superannuated employees. The number of men employed by the company is about 13,000. The rates appear to be somewhat higher than those paid by the Pennsylvania Railroad, and the regulations provide that the term "continuous service" shall include cases where a man has been suspended or dismissed or has resigned, provided he was reappointed within six months. An employee 70 years old who has been in the service 35 years or more will receive 50 per cent. of his average pay in the ten years immediately preceding retirement; for a service of 30 to 35 years the rate is 40 per cent.; 25 to 30 years, 30 per cent. There is the usual provision for retirement of disabled persons 65 years old.

The revised official list of officers of the Chicago, Rock Island & Pacific is as follows: R. A. Jackson, vice-chairman of executive committee and general counsel; H. U. Mudge, president; J. E. Gorman, first vice-president in charge of freight traffic; F. O. Melcher, second vice-president in charge of operation; John Sebastian, third vice-presient in charge of passenger traffic; E. S. Moore, vice-president in charge of purchases; Geo. H. Crosby, vice-president, secretary and treasurer; G. T. Boggs, vice-president, assistant secretary and assistant treasurer; H. M. Sloan, vice-president and assistant to vice-chairman of executive committee; A. E. Sweet, assistant to president; Roberts Walker, assistant general counsel; E. B. Peirce, general solicitor; E. C. Lindley, general attorney; M. L. Bell, general attorney; W. F. Evans, general attorney for Missouri; Stringer & Seymour, attorneys for Minnesota; W. F. Dickinson, eastern attorney; J. J. Quinlan, assistant secretary and assistant treasurer; W. Hodson, assistant treasurer; F. Nay, comptroller; W. H. Burns, general auditor; W. S. Tinsman, general manager; L. M. Allen, passenger traffic manager; W. J. Leahy, general passenger agent; Geo. H. Lee, general passenger agent. Vice-Chairman R. A. Jackson, Vice-Presidents G. T. Boggs and H. M. Sloan, also Roberts Walker, W. F. Dickinson and J. J. Quinlan have offices at New York; W. F. Evans and George H. Lee at St. Louis, Mo.; and Stringer & Seymour at St. Paul, Minn. All other officials have their headquarters at Chicago.

The Grand Trunk, mentioned in the *Railroad Age Gazette* of November 26 as figuring on 20 locomotives, has ordered five simple 4-6-2 locomotives.

General Dimensions.

Weight on drivers	139,000 lbs.
Total weight	210,000 lbs.
Cylinders	22 in. x 28 in.
Diameter of drivers	73 in.
Type of boiler	Extended wagon top
Working steam pressure	200 lbs.
Heating surface, tubes	3,340 sq. ft.
" " firebox	169 "
" " total	3,509 "
Tubes, number	309
" outside diameter	2 in.
" length	20 ft. 6 in.
Firebox, type	Wide
" length	96⅞ in.
" width	75¼ "
" material	Steel
Grate area	50.62 sq. ft.
Tank capacity	7,000 gals.
Coal capacity	10 tons

Special Equipment.

Axles	Steel
Bell ringer	G. T. R. standard
Boiler lagging	Asbestos and T. & G. Pine
Brakes	Westinghouse E. T. equipment
Brake-beams	G. T. R. standard
Brake-shoes	G. T. R. standard
Couplers	Washburn or Melrose
Driving boxes	Steel
Headlight	G. T. R. standard
Injector	Hancock No. 10
Piston and valve-rod packings	U. S. standard
Safety valve	Star muffled
Sanding devices	Hanlon
Sight-feed lubricators	G. T. R. standard
Springs	Peach and Tozer
Staying	Radial
Steam gages	Utica
Steam heat equipment	Gold
Tires	Open-hearth on all except tender
Tubes	Charcoal iron lap-welded
Valve gear	Stephenson
Wheel centers	All steel

Disastrous Wreck at Greensboro, N. C.

In the derailment of southbound passenger train No. 11, of the Southern Railway, on a trestle bridge a few miles north of Greensboro, N. C., on Wednesday morning last, 15 persons are reported killed and nearly every person on the train injured, several of the injuries being fatal. One account says that the derailment was due to a broken rail. George J. Gould was a passenger on the train that was wrecked, but was not injured.

Supply Trade Section.

H. S. Bradfield, formerly general sales agent of the New York Car Wheel Co., New York, has resigned.

The American Steel Foundries, Chicago, is to build a new core shop at the Chester, Pa., plant. The building will be 40 ft. x 100 ft.

Herbert H. Hewitt, president of the Magnus Metal Co., New York, has been elected a director of the Seaboard National Bank, New York.

E. H. Rollins & Sons, dealers in bonds, Boston, Chicago, Denver and San Francisco, have opened offices at 43 Exchange place, New York.

Aaron Dean, formerly western manager of the Federal Signal Co., Albany, N. Y., at Chicago, has been appointed general manager of the same company, at Troy, N. Y.

The Carborundum Co., Niagara Falls, N. Y., has let the contract to the Turner Construction Co., New York, for a three-story crusher building at the Niagara Falls plant.

The Cincinnati Car Co., Cincinnati, Ohio, plans to build an addition to its plant to care for the erecting, blacksmith and foundry shops. The new building will be 100 ft. wide and 250 ft. long.

The Western Electric Co., Chicago, is to build new shop buildings at the Hawthorne, Ill., plant. Noelke & Richards, Indianapolis, Ind., will furnish the structural steel required, about 1,000 tons.

Due to increased business, The Buckeye Jack Manufacturing Co., Louisville, Ohio, has purchased a large plant at Alliance, Ohio, which has been remodeled and to which the company will move on January 1.

The Birmingham Rail & Locomotive Co., Birmingham, Ala., has bought eight acres in North Birmingham as a site for a plant to repair railway equipment. The completion of this plant will greatly increase the company's present capacity in this line.

Announcement is made of the reorganization of the Washburn Steel Casting & Coupler Company, Minneapolis, Minn. Edwin C. Washburn, the company's new manager, has taken charge, and reports every indication of a heavy business during the coming year.

The Westinghouse Air Brake Co., Pittsburgh, Pa., has declared a quarterly dividend aggregating 5 per cent. on its capital stock of $14,000,000. There was a regular quarterly dividend of 2½ per cent., an extra dividend of 1½ per cent. and a special dividend of 1 per cent. It is reported that the month of November was the largest single business month in the history of the company.

Watters' A B C pneumatic track sanders, made by J. H. Watters, assistant master mechanic, Georgia Railroad, Augusta, Ga., have been specified for the two Mikado locomotives recently ordered by the Missouri & North Arkansas from the Baldwin Locomotive Works. In the specifications for these engines, published in the *Railroad Age Gazette* of November 26, Leach sanders were erroneously named.

The Juniors and Seniors from Purdue University, on their annual inspection trip, spent December 3 at the plant of the Dodge Manufacturing Company, Mishawaka, Ind. Special exhibits were arranged to illustrate the various steps in the manufacture of pulleys, clutches, balance wheels, and the Eureka water softener. Officers of the company, especially the Purdue alumni, served as an entertainment committee, and had charge of the party during the day, explaining every process in detail.

The Isthmian Canal Commission, Washington, D. C., will receive bids until December 20 for steel and manganese steel castings, wire rope, chain, sheet tin, wire netting, saws, timber carriers, pipe cutters, etc. (Circular No. 545.) Bids are also asked up to December 23 for lumber, cast-steel shipper friction wheels, hack saw blades, electrical attachments, wire, etc. (Circular No. 546.) Bids are also asked up to December 27 on steel, iron, copper, brass, zinc, steel cable, wire, etc. (Circular No. 547.)

TRADE PUBLICATIONS.

Goheen Mfg. Co.—The Goheen Mfg. Co., Canton, Ohio, has issued two folders calling attention to two of the company's specialties. One is on "Galvanum," a treatment for new galvanized iron, and the other is on "Carborizing Coating," a protective coating for iron and steel.

Missouri Pacific-Iron Mountain.—The trip from St. Louis to Mexico City over the Iron Mountain line, including all the little side trips along the route, is pleasingly described in a 50-page booklet just issued. The title "Mexico, a Foreign Land, a Step Away," is the key note of the 131 views and the descriptive matter contained in the little book. After looking over the collection of pictures one is ready to accept the statement of a noted traveler, quoted in the title of the frontispiece, "Mexico is the most marvelously picturesque country under the sun."

Ryerson Reference Book, 1910. Joseph T. Ryerson & Son, Chicago, has published a book of 370 pages entitled "Ryerson Reference Book—1910." The object of the publication is to list and describe the many specialties carried by the company, which on account of a lack of space are omitted from the monthly journal and stock list. The reference book contains also a list of stock on hand on the day of publication and various tables and information in condensed form for the use of manufacturers and engineers in making estimates and drawing up specifications.

Jacks and Pumps.—Catalogue No. 7, issued by Richard Dudgeon, New York, is a price list of a number of Dudgeon products. The hydraulic jacks include vertical jacks in styles adapted to various classes of work and in sizes from four to 50 tons lift. The horizontal jacks, which run out as far horizontally as vertically, are furnished in sizes from seven to 250 tons and in different styles. The universal jack is fully described, and a number of pages of dimensions for use and maintenance are given. This jack is made in sizes from 10 to 60 tons lift. The universal horizontal jack is then described. This is made in sizes from 70 to 250 tons. It is shown in several styles, including one with an independent cylinder and ram, which is made in sizes from 40 to 530 tons. Universal hydraulic pressure pumps are described as well as hydraulic punches and tube expanders. Full price lists and dimensions are given throughout the catalogue, which measures 7¼ in. x 4 in.—a handy size for the pocket.

RAILROAD STRUCTURES.

ANNISTON, ALA.—According to press reports the Louisville & Nashville will make improvements to the union passenger station in Anniston, at a cost of $35,000.

ARGENTA, ARK.—The St. Louis Southwestern is to build a passenger station and a freight house. Plans are now being revised and it is expected that both buildings will be of brick.

BELLEVILLE, ONT.—The Grand Trunk is said to have decided to put up an engine house, on which work will be started at once. The cost of the improvement will be $100,000.

BELLINGHAM, WASH.—The Northern Pacific is preparing plans for a $50,000 station to be built at Railroad avenue and Magnolia street. Work is well under way on the freight terminal mentioned Sept. 10.

BUFFALO, N. Y.—See New York Central & Hudson River under Railroad Construction.

Celilo, Ore.—The Oregon Trunk is said to have located the site about one mile west of this place for its proposed bridge over the Columbia river to connect with the Spokane, Portland & Seattle. The bridge is to have five channel spans and several deck spans, the longest of which is to be 320 ft.

Colorado Springs, Colo.—According to press reports the Atchison, Topeka & Santa Fe will begin work soon on a passenger station. The plans call for a building three stories high, part of which is to be used as a Harvey eating house and hotel. The cost is estimated between $110,000 and $125,000.

Corvallis, Ore.—An officer of the Corvallis & Eastern writes that a contract has been let to Robert Wakefield, of Portland, Ore., for a passenger station at Corvallis. The building is to be one-story high, of concrete, 30 ft. by 130 ft., and will cost about $20,000. Work is now under way.

Cummock, N. C.—See Durham & Charlotte under Railroad Construction.

Denison, Tex.—The Missouri, Oklahoma & Gulf Bridge & Railway Co. has been incorporated in Oklahoma, with $250,000 capital and headquarters at Muskogee, Okla. The company is to build a bridge to cost $200,000 for the Missouri, Oklahoma & Gulf over the Red river on the extension from Oklahoma south to Denison, Tex. Contract is said to have been given for this work to the Wisconsin Bridge & Iron Co., of Milwaukee, Wis. The bridge is to be built at Carpenter's Bluffs and will be 1,100 ft. long. It is expected to have the work finished and the bridge ready for traffic by June, 1910. (Dec. 10, p. 1172.)

Keating Summit, Pa.—See Buffalo & Susquehanna under Railroad Construction.

Manchester, Va.—The Virginia Railway & Power Co. will make improvements, it is said, at a cost of $100,000. The work is to include a new modern terminal passenger station, car barn and repair shops, to be built at Seventh and Perry streets.

Marshalltown, Iowa.—The Iowa Central is reported to be considering the building of a second addition to its Marshalltown machine shops. (May 28, p. 1148.)

Memphis, Tenn.—Plans for the union station have been formally accepted and work is to begin within 30 days. The ordinance allows two years for the completion of the building. (Oct. 8, 1909.)

New Berne, N. C.—An officer of the Norfolk & Southern writes that no definite plans have been made for rebuilding the shops at New Berne, which were damaged by fire on November 6. Temporary shops were provided to take care of the small repairs and the heavier repairs are being made at the Berkley, Va., shops. (Nov. 12, p. 947.)

Ogden, Wash.—The Harriman Lines plan to build a passenger car shop, enlarge the machine shop, build additional side-tracks and remodel the commissary building during the coming year.

Quebec, Que.—Contractors may secure information at the office of the Board of Engineers, Department of Railways and Canals, Canadian Express building, Montreal, after January 3, 1910, for the superstructure of the Quebec bridge. Bids are to be asked for the superstructure of a 1,758-ft. span bridge 88 ft. wide. L. K. Jones, secretary. (Nov. 26, p. 947.)

Ravena, N. Y.—See New York Central & Hudson River under Railroad Construction.

Rochester, N. Y.—See New York Central & Hudson River under Railroad Construction.

Taylor, Tex.—Contract has been given to George Byrne, of Houston, Tex., by the International & Great Northern, for dredging and excavating a large lake and reservoir at Taylor. Work on the roundhouse, shops and car repairing sheds in the western part of the city is under way and is expected to be finished about the time work on the reservoir is completed. The cost of the improvements will be about $100,000. (Aug. 27, p. 388.)

Texas City, Texas.—The Texas City Transportation Co. has completed plans for building terminals to include eight or ten reinforced concrete warehouses, two piers, a grain elevator and coal docks. Electric cranes will be installed in all warehouses and electric conveyors will connect the warehouses and docks. (May 21, p. 1102.)

Vancouver, B. C.—The British Columbia Electric Railway, it is said, will spend a large amount of money for improvements, to include a 20,000-h.p. steam auxiliary plant in Vancouver.

FOREIGN RAILWAY NOTES.

About $180,000 has been authorized for building a branch of the Central of Brazil from Santa Barbara to Santa Anna.

A company with a capital of about £4,917,000 ($24,585,000) is being formed to build a new railway from St. Petersburg, Russia, to Helsingfors, Finland.

The Christiania-Bergen Railway, the new railway running between Bergen, Norway, and Christiania, was inaugurated on November 26. It has taken 15 years to construct and is considered the most important economic work Norway has yet achieved.

It is intended to introduce a government bill in the Natal Parliament providing for a loan of £370,000 ($1,850,000) for building railways and buying equipment. The money is also to be used for building harbor works at Durban and for the extension of telegraph lines.

The Prussian State Railroads have on one of their pension lists 335,176 persons of the category of "laborers"—that is, men who are not regularly appointed employees. It might be thought that these would be mostly young men, with only temporary connection with the railways; but the records show that 1,468 of them were over 70, and nearly 11 per cent. of the whole number over 50; on the other hand, 87,820 (26.2 per cent.) were 20 or less. The applications of the railway men for places as apprentices in the shops for their sons are so numerous that they cannot all be granted.

Vice-Consul-General E. G. Babbit of Yokohama, reports as follows concerning railway building, extensions and improvements by the government and by private enterprise in Japan: It is reported in the newspapers that in the imperial railway budget for the fiscal year ending March 31, 1911, $9,960,000 will be included for the extension and improvement of the imperial railways. For the appropriation of this amount no parliamentary approval will be required, as the detailed finance of the imperial railway board is independent of the general government budget. It is explained in some of the papers that this question of improvement has really been considered since 1907, when the nationalization of the railways was concluded. It was then fully recognized that extensive improvements were required, but the matter had to be postponed on account of various complications connected with the organization of the new imperial railway board.

Consul John F. Jewell, of Melbourne, shows by the following statistics the enormous import of over-sea timber into the Australian state of Victoria during the year ended June 30, 1909: From unofficial records carefully collated and compiled it appears that the gross imports reach 114,543,000 superficial feet, or over 10,000,000 more than in 1907-8. Oregon pine was 11,200,000; kauri, 990,000; New Zealand white pine, 2,050,000; and Pacific pine (logs), 5,050,000 feet; in round figures, more than in the previous year. The consumption of all over-sea timbers recorded was 98,858,000, about 2,053,000 superficial feet more than in 1907-8 and within 4,057,000 of the record in 1906-7. Stocks in the aggregate at the end of the fiscal year were the largest recorded, but Baltic flooring, etc., figured over 4,300,000 superficial feet short of the total for last year. The great increase is in American products, being in round figures 5,000,000 Oregon, 5,100,000 white pine, and 6,000,000 superficial feet Pacific pine in excess of the imports for the previous year.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Delaware, Lackawanna & Western is in the market for 48 locomotives.

The New York, Chicago & St. Louis is in the market for 20 locomotives.

The Southern has ordered 10 4-6-2 locomotives from the Baldwin Locomotive Works.

The Toronto, Hamilton & Buffalo has ordered one 2-8-0 locomotive from the American Locomotive Co.

The Georgia, Southern & Florida has ordered two 4-6-2 locomotives from the American Locomotive Co.

The Missouri Pacific is said to be figuring on locomotives, probably between 40 and 50. This item is not confirmed.

The Gilmore & Pittsburgh is said to have ordered five consolidation and two Mikado locomotives from the Baldwin Locomotive Works. This item is not confirmed.

The Duluth, Missabe & Northern is understood to be figuring with the Summers Car Co. for 2,000 ore cars. Mention of this equipment was made in the *Railroad Age Gazette* of November 19.

The Chicago, Milwaukee & St. Paul, previously reported in the *Railroad Age Gazette* as being in the market for passenger cars, is understood to have ordered 150 of these cars from the Pullman Co.

The Elgin, Joliet & Eastern has ordered, from the American Locomotive Co., 12 six-wheel switch engines, cylinders 19 in. x 26 in.; five eight-wheel switch engines, cylinders 22 in. x 28 in., and five consolidated engines, cylinders 22 in. x 28 in. The inquiry for this equipment was mentioned in the *Railroad Age Gazette* of December 10.

The Minneapolis, St. Paul & Sault Ste. Marie, as mentioned in the *Railroad Age Gazette* of November 26, has ordered four simple 4-6-2 locomotives from the American Locomotive Co.

General Dimesions.

Weight on drivers	145,000 lbs.
Total weight	222,000 lbs.
Cylinders	24½ in. x 26 in.
Diameter of drivers	69 in.
Type of boiler	Extended wagon top
Working steam pressure	160 lbs.
Firebox, type	Wide
" length	96 in.
" width	70¼ "
Grate area	46.8 sq. ft.
Water capacity	6,500 gals.
Coal capacity	10 tons

The Maine Central has ordered, from the American Locomotive Co., one Pacific and five consolidation locomotives for delivery in April, 1910.

General Dimensions.

	Pacific.	Consolidation.
Type of locomotive	Pacific.	Consolidation.
Weight on drivers	138,500 lbs.	167,000 lbs.
Total weight	215,000 lbs.	193,000 lbs.
Cylinders	22 in. x 28 in.	22 in. x 28 in.
Diameter of drivers	73 in.	63 in.
Type of boiler	Straight.	Wagon top.
Working steam pressure	200 lbs.	200 lbs.
Heating surface, tubes	3,267 sq. ft.	2,797 sq. ft.
" " firebox	178 "	170 "
" " total	3,445 "	2,967 "
Tubes, number	295	351
" outside diameter	2¼ in.	2 in.
" length	19 ft. 6 in	15 ft.
Firebox type	Wide.	Wide.
" length	96 in.	96 in.
" width	75¼ in.	75¼ in.
" material	Steel.	Steel.
Grate area	50 sq. ft.	50.2 sq. ft.
Water capacity	6,800 gals.	7,000 gals.
Coal capacity	11 tons.	12 tons.

Special Equipment.

Axles	Steel
Boiler lagging	Magnesia
Brakes	Westinghouse
Driving boxes	Steel
Headlight	Oil
Valve gear	Walschaerts
Wheel centers	Cast steel

CAR BUILDING.

The Cincinnati Traction Co. is in the market for 75 cars.

The Philadelphia & Reading is in the market for 2,500 box and gondola cars.

The Intercolonial has ordered six baggage cars from the Rhodes, Curry Co.

The Mather Horse & Stock Car Co. is in the market for 250 thirty-ton automobile cars.

The Whatcom County Railway & Light Co. is in the market for three combination cars.

The Atlanta & West Point is in the market for 25 forty-ton steel underframe gondola cars.

The Wrightsville & Tennille expects to buy one coach and one combination mail and baggage car soon.

The San Diego & Arizona, Union building, San Diego, Cal., is in the market for 20 fifty-ton steel flat cars.

The Delaware, Lackawanna & Western is in the market for 10 express, 15 suburban and 10 broad vestibule coaches.

The Philadelphia & Reading has ordered 45 coaches and 20 miscellaneous passenger cars from Harlan & Hollingsworth.

The Gulf, Texas & Western is said to have ordered 10 forty-ton coal cars and three cabooses from the Haskell & Barker Car Co. This item is not confirmed.

The Maine Central has ordered 100 fifty-ton all-steel gondolas and 100 forty-ton steel underframe flat cars from the Standard Steel Car Co. for 1910 delivery.

The St. Louis Southwestern is said to have ordered 14 passenger coaches and six chair cars from the American Car & Foundry Co. This item is not confirmed.

The Erie, previously reported in the *Railroad Age Gazette* as being in the market for 100 furniture cars, has ordered this equipment from the Pressed Steel Car Co.

The Northern Pacific, previously reported considering the purchase of Lidgerwood cars, has ordered 400 fifty-ton Hart convertible cars from the Rodger Ballast Car Co.

The Cornwall & Lebanon is said to have ordered 50 forty-ton steel gondola cars and 50 thirty-ton box cars from the Pressed Steel Car Co. This item is not confirmed.

The Toledo & Ohio Central order of 1,000 fifty-ton gondola cars from the Ralston Steel Car Co., as mentioned in the *Railroad Age Gazette* of December 3, has been confirmed.

The Gilmore & Pittsburgh, reported in the *Railroad Age Gazette* of September 10 as being in the market for freight cars, has ordered 60 forty-ton flat cars from the Hicks Locomotive & Car Works.

The Maine Central has ordered, from the Laconia Car Co., six coaches and three baggage and mail cars for delivery in July, 1910. The coaches will measure 67 ft. long, inside, and the baggage and mail cars 60 ft. long, inside. Bodies will be of wood and underframes of steel. The special equipment includes:

Axles	Steel
Bolsters, body	Cast steel
Bolsters, truck	Cast steel
Brakes	Westinghouse high-speed
Heating system	Vapor
Lighting system	Gas
Platforms	Steel
Trucks	Four-wheel
Vestibules	On coaches, steel-tired

The Gilmore & Pittsburgh, reported in the *Railroad Age Gazette* of September 10 as being in the market for 100 forty-ton box cars, has ordered this equipment from the Hicks Car & Locomotive Works. These cars will be 40 ft. 3¾ in. long and 8 ft. 6⅛ in. wide, inside measurements, and 40 ft. 10⅞ in. long and 9 ft. 1¼ in. wide, over all. The special equipment includes:

Axles	Standard Forging Company
Bolsters	Pittsburgh Equipment Company
Brasses	Chicago journal bearing
Couplers	Monarch, 5 x 7 shank
Door fastenings	Security
Draft Gear	Westinghouse
Journal boxes	McCord
Roofs	Hutchins Outside
Springs	Pittsburgh Company
Wheels	Griffin

The Chicago, Milwaukee & St. Paul, previously reported in the *Railroad Age Gazette* as being in the market for passenger cars, has ordered the following equipment: One compartment sleeper, 22 twelve-section sleepers, 36 ten-section sleepers, 8

tourist sleepers, four parlor cars, 20 dining cars and 59 coaches from the Pullman Car Company; one compartment sleeper, 9 buffet observation cars, 10 tourist sleepers, 10 baggage cars and 18 baggage and mail cars from the Barney & Smith Car Co.; 27 coaches and 18 baggage cars from the American Car & Foundry Co.

The Charlotte Harbor & Northern, as mentioned in the *Railroad Age Gazette* of November 19, has ordered two baggage and express cars, two baggage, mail and express cars, five coaches, 25 flat cars and 25 ventilated box cars from the Barney & Smith Car Co. The freight cars will be of 60,000 lbs. capacity and will have wood bodies and steel underframes. In addition to the specialties to be furnished by the builders the following are specified on the passenger cars:

Brake-beams	Simplex
Curtain material	Pantasote
Heating	Spear stoves
Lighting	Oil lamps
Seat covering	Rattan

The following specialties apply to the freight cars:

Brakes	Westinghouse
Brake-beams	Simplex
Couplers	Tower
Doors	Side
Draft gear	Farlow
Journal boxes	Symington

MACHINERY AND TOOLS.

The British Columbia Electric Railway is to build a power plant at Vancouver, B. C., as mentioned under Railroad Structures.

The Cincinnati Car Co., Cincinnati, Ohio, will buy a few machines, including hammers, punching machines and bending and straightening machines for the addition to its plant mentioned under Supply Trade News.

The Jones & Laughlin Steel Co., Pittsburgh, Pa., has ordered eight cranes from the Cleveland Crane & Engineering Co., Cleveland, Ohio; three from the Niles-Bement-Pond Co., New York, and two from the Whiting Foundry & Equipment Co., Chicago. The cranes range in capacity up to 25 tons and are for use in the company's new Aliquippa plant. The inquiry for these cranes was mentioned in the *Railroad Age Gazette* of October 15.

IRON AND STEEL.

The Delaware & Eastern is reported in the market for 12,000 tons of rails.

The Mexican Northern is reported to be in the market for 8,000 tons of rails.

The Philadelphia & Reading has ordered 5,000 tons of rails from the Pennsylvania Steel Co.

The Harriman Lines have ordered 25,000 tons of rails in addition to the orders previously reported.

The New Orleans & Northeastern has ordered 1,600 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Georgia Railway is reported to have ordered 3,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

The Interborough Rapid Transit has ordered from the American Bridge Co. the 500 tons of structural steel for elevated and station work.

The Tennessee Coal, Iron & Railroad Co. has ordered 2,000 tons of fabricated steel, 1,600 tons of which will be used in an open hearth plant at Ensley, Ala.

The Chicago, Milwaukee & St. Paul has ordered 1,200 tons of structural steel from the Minneapolis Steel & Machinery Co., and divided an order for 500 tons between the Lackawanna Steel Co. and the Chicago Bridge & Iron Co.

Dr. F. S. Pearson, head of the Mexico Northwestern Railway and the Mexican Light & Power Co., and his associates, will, it is reported, build chemical and steel works in Mexico City at a cost of $1,000,000, gold. The principal products will be light steel rails, tool and drill steel and calcium carbide. The erection of the plant is to be started at once.

General Conditions in Steel.—Reports indicate that there has been a general falling off in orders for steel during the past week, and that the average business for December will be considerably below what it was in the two previous months. Orders for the current month, however, should average 40,000 tons per day, as compared with 60,000 tons per day in October and November. A shrinkage of orders in the month of December is usually expected. It is now thought that the United States Steel Corporation will show an unfilled tonnage of nearly 6,500,000 tons at the close of the year. The unfilled tonnage at the close of 1908 amounted to more than 3,600,000 tons, showing that orders during the current year have nearly doubled those of 1908.

SIGNALING.

The Baltimore & Ohio Southwestern is building a new mechanical interlocking plant at the crossing with the Illinois Central at Olney, Ill., and one at the crossing of the East St. Louis & Suburban electric line at Caseyville, Ill.

At Indianapolis last week, Friday, the Indiana State Railroad Commission held a conference with about 100 railway officers to discuss block signaling. The commission has postponed to July 1, 1910, the date when the Indiana law requiring companies having receipts of $7,500 a mile to install block signals shall be enforced, but intends to secure compliance as soon as possible. At the conclusion of the discussion the commission announced that the subject would be taken up with the railway companies one by one.

The Southern Pacific Company, Pacific system, has under construction, or proposed, for the coming year 14 new interlocking plants. Two of these, at Oakland, will be electro-pneumatic; one at Kirkham street, 11 levers, and one at Third and Webster streets, 17 levers. Six of the plants will be electric. These are at Sacramento, 31st and R streets, 14 levers; Elmhurst, 36 levers; Tracy, 40 levers; College Park, 40 levers; Mission Bay, 64 levers; Brighton, 29 levers. Six plants will be mechanical, as follows: Bloomington, Bena, Lawton, Coyote Creek Drawbridge, Warm Springs Creek Drawbridge, Live Oak. Three of these mechanical plants (two of them at drawbridges) will have only four levers each.

The plans of the Atchison, Topeka & Santa Fe for the ensuing year include two new electric and 17 new mechanical interlocking plants, besides the reconstruction of interlocking at a number of places where a second main track is to be laid. The two electric interlockings will be at the Illinois river bridge, 20 levers, and at Mulvane, 52 levers. The mechanical interlockings, which are from 16 to 20 levers each, will be at Williamsfield, Appleton, Ormonde, Gorin, Rutledge, Baring, Hurdland, Gibbs, La Plata, Cardy, Elmer, Ethel, Melvern, Elmdale-Clements, Strong City, Plymouth-Strong City and Colorado Springs. On 13 miles of line automatic disk block signals are to be taken out and electric semaphores put in their place.

The plans of the Union Pacific for the year 1910 contemplate the installation of new electric interlocking plants at seven places, namely: Omaha, 20th street, 53 levers; Omaha, Summit street, 36 levers; Lincoln, Fourth and K streets (junction with C., B. & Q.), 49 levers; Manhattan, Kan., 37 levers; Topeka, Kan. (crossing with C., R. I. & P.), 63 levers; Topeka, Kan. (crossing with A., T. & S. F.), 16 levers. The plans also include 12 mechanical plants as follows: South Omaha (junction with C., R. I. & P.); Lincoln, Fourth and Hill streets; Northport, Neb.; Quimby, Colo.; Milliken, Colo.; Wild Cat Mound, Colo.; St. Vrain, Colo.; Brighton, Colo.; Eaton, Colo.; Sterling, Colo.; Armstrong, Kan.; Fremont, Neb. (crossing with F., S. Y. & L.). These mechanical plants will have machines of from 10 to 19 levers.

The Federal Signal Company has under construction the following interlocking plants:

At Garrison, Mont., mechanical, Saxby & Farmer machine, 28 lever frame, 27 working levers. Power-operated distant signals, all signals upper quadrant. There is detector electric locking in addition to detector bars. The plant is at a junction of the Chicago, Milwaukee & Puget Sound and the Northern Pacific.

At Carman, Minn., mechanical, Saxby & Farmer machine, 24 lever frame, 20 working levers, power-operated distant signals, electric locking and detector bars. All signals upper

quadrant. This plant is at a crossing of the Great Northern and the Northern Pacific.

At Superior, Wis., mechanical plant, Saxby & Farmer machine, 28 lever frame, 22 working levers, wire-connected distant signals. All signals upper quadrant. The plant covers a crossing and junction of the Minneapolis, St. Paul & Sault Ste. Marie and the Duluth, South Shore & Atlantic.

At Griffith, Ind., an electric plant, 64 lever frame, 53 working levers, electric locking and detector bars. This plant is at a crossing of the Elgin, Joliet & Eastern, the Michigan Central, the Grand Trunk, the Erie and the Chicago, Cincinnati & Louisville. Signals on the Erie will be upper quadrant, all others lower quadrant, two-position, 60 deg. It is expected that the plant will be put in service within a month.

At Edwardsville, Ill., mechanical, Saxby & Farmer machine, 48 lever frame, 37 working levers; crossing of the Toledo, St. Louis & Kansas City, St. Louis & Illinois Belt and Illinois Terminal.

At Little Rock, Ark., mechanical, Saxby & Farmer machine, 36 lever frame, 32 working levers; crossing of the Iron Mountain and the Rock Island. All signals on the Rock Island will be upper quadrant and the distant signals on both roads will be power operated.

The Rock Island has just completed with its own forces and put in service a mechanical interlocking plant at White City, Kan., at the crossing of the Missouri, Kansas & Texas, both lines single track. The Saxby & Farmer machine has a 24-lever frame with 18 working levers. No detector bars are used on either road, but complete electric locking, route, approach, detector and indication is provided. All high signals on the Rock Island are power-operated, three-position, upper-quadrant, and the dwarf signals are wire-connected, two-position, upper-quadrant. The M., K. & T. signals are all mechanically-operated, lower-quadrant, two-position. On the Rock Island automatic block signals are in service at this point and the plant is taken into the block system.

High Pressure Pintsch Gas for Transport Service.

Recent experimental research made by the Pintsch Compressing Co., New York, has demonstrated the fact that dry Pintsch gas, such as is obtained by the regular Pintsch process, is suitable for transportation under a pressure of 100 atms. or over.

For this purpose Pintsch gas, from which all liquid hydrocarbons have been removed while under the pressure of 14 atms., is used, and the dry gas is compressed directly into steel flasks at high pressure. Under this high pressure a partial condensation of the gas takes place, which, however, disappears as soon as the pressure is reduced, the gas presenting again its original dryness and other characteristics with but an inappreciable loss in candle power.

A steel flask of 3.75 cu. ft. capacity and weighing about 330 lbs. will, when charged to a pressure of 100 atms., yield about 500 cu. ft. of gas at atmospheric pressure. From this it is seen that the gas under these high pressures deviates considerably from Boyle's Law, in accordance with which the flask would be expected to yield but 375 cu. ft. of gas at atmospheric pressure. The deviation from Boyle's Law at a pressure of 100 atms. amounts to about 33 per cent. increase. This departure, combined with the fact that small seamless flasks can be made of steel of high tensile strength, render it possible to reduce the weight of the transport holder for a given quantity of gas carried, by over 50 per cent. The space occupied by the high-pressure holders is only about one-tenth of that of the holders used in transporting gas at a pressure of 14 atms.

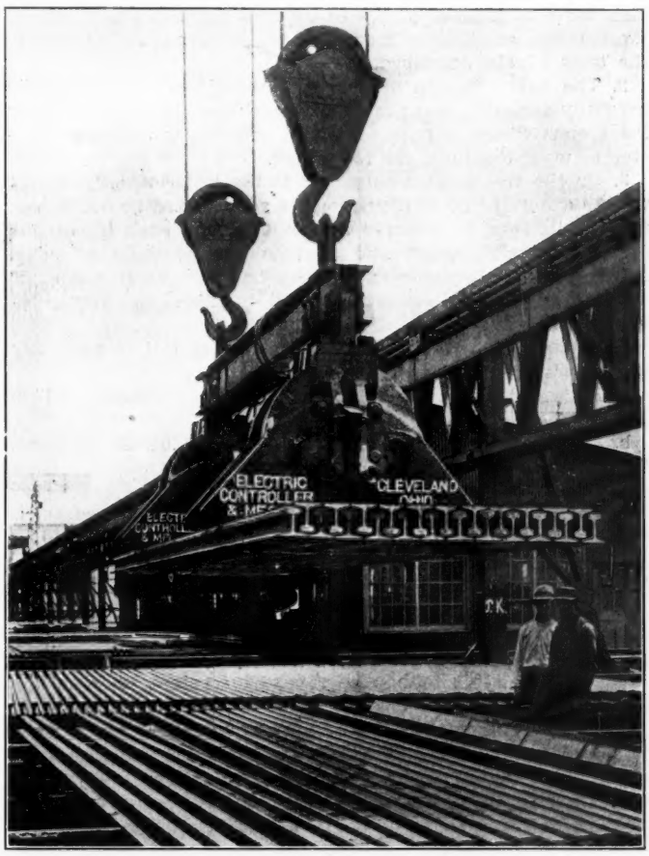
The true value of the high-pressure transportation becomes, however, most apparent in cases where no compressing facilities are available, at the point of distribution, to transfer the gas from the transport holder to buoys or cars; where filling can only be accomplished by equalizing the pressure. In such cases but about 30 per cent. of the gas carried in holders at a pressure of 14 atms. is available for filling, and the remainder of the gas returns to the supply station unused. In the case of high-pressure transportation, however, fully 90 per cent. of the gas transported becomes available for filling, and under these circumstances the weight of the transport holders for a given quantity of gas filled to buoys or cars is only about one-sixth and the volume only about one-thirtieth of that of the transport holders used by the former method.

There is a distinct difference between high-pressure Pintsch gas and the so-called Blau gas. The former is a dry gas, possessing all the characteristics of regular Pintsch gas, great care being taken in the process of manufacture to remove from the gas all liquid hydrocarbons. The same liquid hydrocarbons are retained in the Blau gas, and others added, to exert a solving influence upon the remaining dry constituents of the gas, and thus effect a reduction in volume. The presence of these hydrocarbon liquids are direct cause of difficulties experienced in connection with Blau gas, due to accumulation of liquid in the regulating devices at the point of consumption, and due to freezing up in cold weather.

Rail Handling Magnets at Gary.

The saving to be made by the use of lifting magnets has been generally recognized during the past few years, and many new applications of magnets have been made. The Electric Controller & Manufacturing Co., Cleveland, Ohio, has introduced many improvements in design, and has also designed and applied new types of magnets to new kinds of service.

An application which required a new design of magnet was



Lifting Magnets at Gary, Ind.
Locked sections of 33-ft. rails, weighing over 10 tons.

that of the handling of the rail output at the mills of the United States Steel Corporation's plant at Gary, Ind. This mill is of the most modern design in every respect, and electric power has been used throughout, even to the driving of the rolls by 6,000 h.p. motors. The handling of finished rails by electric power through the use of lifting magnets seemed, therefore, a logical conclusion. It was particularly desirable to handle the rail output with magnets for the following reasons: Sufficient saving in labor cost could be made to make the application commercially attractive; a large saving in the time of handling would be effected; much less timber spacing material would be necessary in loading; there would be no

possibility of bending the rails while loading by magnets, and any loss for this reason would be overcome.

While it is desirable from the standpoint of rail mills and railways to ship rails in locked sections, this arrangement of the rails is particularly difficult to handle with the magnets. This difficulty arises from the fact that the top layer of the rails practically short-circuits the magnet field, and only a very powerful and carefully designed magnet would have sufficient strength to penetrate the top layer of rails and lift the bottom layer.

The magnets which are furnished by the Electric Controller & Manufacturing Co. have been very successful in this respect, as is evidenced by the illustration. These magnets have lifted locked sections of 33-ft. and of 60-ft. rails, the load aggregating 15 tons.

The Water Gage and Lubricator Tubes.

The Pennsylvania Railroad, Lines East and West of Pittsburgh, has adopted the following specifications for glass water gage and lubricator tubes:

1. Glass tubes for water gages and lubricators are to be ordered of such diameters and lengths as the demands require and in lots of five dozen or multiples thereof. They must be carefully wrapped and placed in packages containing one dozen pieces, with the manufacturers' name pasted on each package. For each five dozen, the manufacturers must furnish three additional pieces to be used for test or to replace those taken at random from the packages and submitted to the tests herein described.

2. The tubes bought under these specifications are to be carefully annealed, clear and free from flaws, to have smoothly fused ends where so ordered and of sufficiently uniform diameter to meet the limit for roundness.

3. On the receipt of a shipment at the storehouse, shipment will be examined as to requirements a-b-c, stated below. Three pieces will then be selected at random from each lot of five dozen, properly tagged and sent to the engineer of tests, Altoona, Pa. Shipments must not be used until report is made that the samples have successfully passed the prescribed tests.

4. Shipments will not be accepted if they fail to meet any of the following requirements:

a. If they are $\frac{1}{32}$ of an inch above or below the outside diameter ordered. (See 3.)

b. If they are out of round more than .01 of an inch. (See 3.)

c. If they are not straight. (See 3.)

d. If they do not withstand the dipping test. (See 5.)

e. If they do not withstand the test in the digester. (See 6.)

f. If they do not withstand the hydraulic pressure test. (See 7.)

5. One piece from each lot of five dozen will be heated in valve oil at 350 degs. F. for at least two minutes and as quickly as possible removed from this and dropped into water at 40 degs. F., this test to be repeated 15 times without the tube breaking.

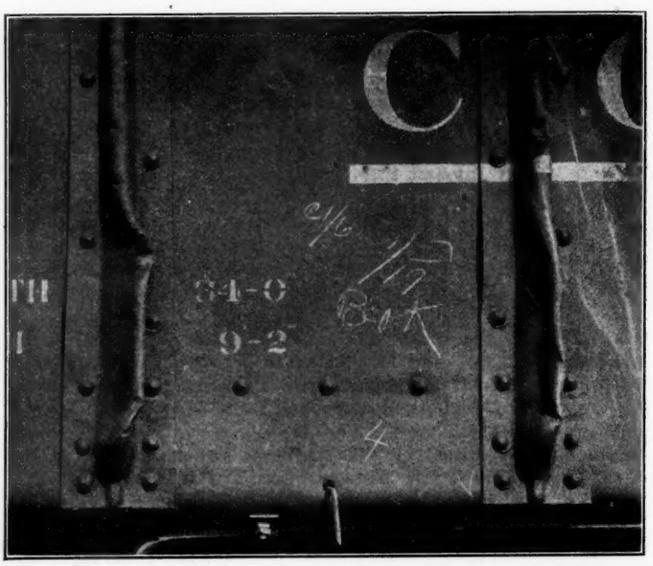
6. One piece from each lot of five dozen will be placed in a digester and subjected to a steam pressure of not less than 75 or more than 100 lbs. pressure, for 72 hours. If at the expiration of this time it becomes cloudy, cracks or shows any indication of dissolving, it will be sufficient cause for rejection of the lot represented.

7. One piece from each lot of five dozen will be placed in a suitable holder and subjected to a hydraulic pressure of 1,000 lbs. per sq. in. for one minute. If the tube burst while under this pressure it will be sufficient cause for rejection of the lot represented.

8. Rejected material will be returned to the manufacturer, who must pay freight charges both ways. Samples of rejected material are usually preserved at the laboratory one month from date of test report. Accordingly in case of dissatisfaction with results of test, manufacturers must make claim for a rehearing, should they desire to do so, within that time. Failure to raise a question for one month will be construed as evidence of satisfaction with the tests, the samples will be scrapped and no claim for a rehearing will be considered.

Elasticity of Silica-Graphite Paint.

It is curious that with all the evidence that has been put forth in speech and press as to the desirability of using on all metallic structures a paint that should dry with a firmly adhesive and yet elastic coat, that so much time should be spent on those paints that are known to be lacking in these very qualities, particularly that of elasticity. A metallic surface, especially if coated with a dark color, is subjected to wide ranges of temperature, and the paint skin, if cracking is to be avoided, must be able to follow all of these changes of temperature without any impairment of its own integrity. The same thing holds true of the change of dimension, due to distortion of the shape of the surface painted. It is not expected

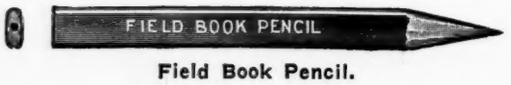


Portion of Car Painted with Silica-Graphite Paint.

that any paint will be able to withstand the abrasive effect of a glancing blow received by a steel car in service, but it is desirable that if the parts are bent so that they do not require immediate repairing, the paint will still hold intact and not crack and prevent moisture from penetrating into the metal and cause rust, which is so destructive of both the metal and the paint. A fine example of this toughness and elasticity of a painted surface is shown in the accompanying illustration of a portion of a steel car that had been painted with the Dixon silica-graphite paint. The car had been struck and the stakes badly distorted, and yet, in all of the surface, there were no cracks in the paint, which still remained intact, and continued to thoroughly protect the metal from the action of rust. This accident and the stretching of the paint did not happen when the car had been freshly painted, so that the paint film was necessarily elastic, but after it had been in service for about a year, when the paint had dried and had reached its condition of permanent elasticity or rigidity as might be; evidently the former in this case. This seems to be a good instance of the durability and endurance of these paints, made by the Joseph Dixon Crucible Co., Jersey City, N. J.

Field Book Pencil.

The accompanying cut shows a pencil just placed on the market by Kolesch & Co., New York. This pencil is particularly adapted for use in connection with the field book. The



Field Book Pencil.

flat shape of the pencil allows its being placed in a book without damaging the binding. It is also useful as a straight edge for ruling lines. The lead is of best quality and of a degree of thickness suitable for such work.